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APRIL 22, 1944

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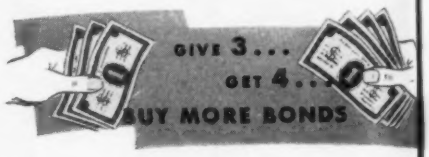

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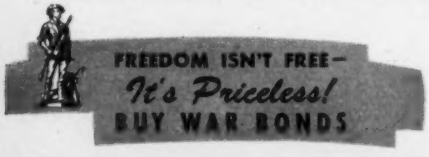

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Lightning Protection of aerial cable

By CAPT. M. H. MORRIS
U. S. Army Signal Corps

LIGHTNING damage to aerial cable plant costs the telephone industry in the United States nearly three-quarters-of-a-million dollars annually for repairs alone. While no known method can stop lightning, considerable can be accomplished in minimizing the resulting damage to aerial cable plant.

Most telephone companies use protectors at cable terminals to prevent these inside cable burns. The protectors ordinarily used are open space cutout blocks, generally placed in a mounting equipped for five pairs of wires with the common or ground side of the blocks connected to the cable sheath. The practice of grounding protectors of this type to the cable sheath rather than to driven grounds was adopted by most companies a few years ago. Since that time, there have been relatively few failures of this type protection when properly installed to do the job for which it was designed.

Present policy with most companies is to place this protection at cable terminals to which aerial lines one-half mile or more in length are terminated. It is the writer's contention that this protection is inadequate for the reason that lightning surges occur on many lines less than one-half mile in length and cases have been noted where lightning entered and damaged the cable through drop wires less than 50 feet long.

A better method of selecting the cable terminals at which protection should be placed is evidently needed in view of the fact that there occurs a country-wide average of one trouble due to lightning on every eight miles of aerial cable each year. This figure does not include those troubles not cleared where sufficient spare pairs are available.

CAPT. M. H. MORRIS, U. S. Army Signal Corps, is now rounding out 30 years of service with the Bell System in northern New Jersey. Starting as a groundman in 1914, he served as lineman and repairman of the New Jersey Bell Telephone Co. before he was called into service in 1917 with the New Jersey National Guard.

He saw active service as a sergeant with the 104th Field Signal Battalion of the 29th Division during the Meuse-Argonne offensive of World War I. Returning to the New Jersey Bell in 1919, he worked two years as a repairman before becoming an insideman and deskman. This was followed by six years as switchman, chief switchman and wire chief of a dial central office. Next, a short term of staff duty, then further field activity as a test bureau wire chief and maintenance supervisor.

During the past 13 years he has been assigned to a staff job with the New Jersey Bell. Although primarily an equipment man, he became interested in cable problems due to the high maintenance costs involved.

Commissioned a captain in the Signal Corps in January 1943, he was assigned to the Army Communications Service, Plant Engineering Agency in Philadelphia.

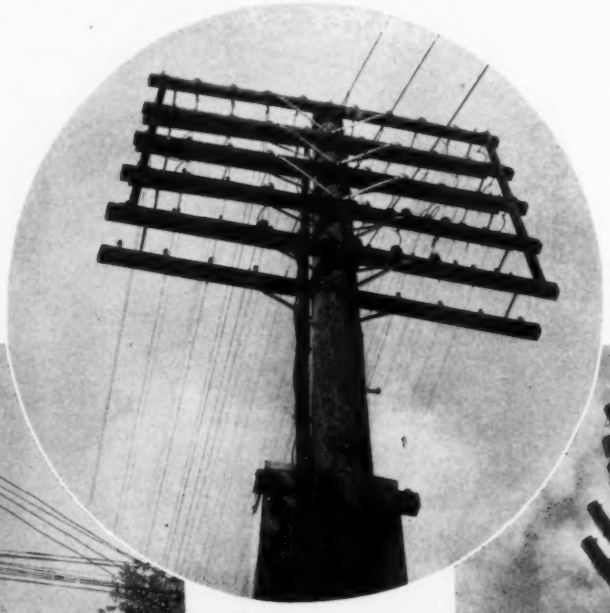
It is a known fact that more lightning damage occurs in rural than in urban areas. There are few cases on record of any fatalities due to lightning in the center of even a small community. On the other hand, the danger of remaining on a golf course or under lone trees during an electrical storm is well recognized and a long record of fatal accidents justifies this belief.

It follows, then, that a dwelling house situated in a position similar to the golf player or a tall tree, and representing the best means by which a lightning charge may reach the ground, is likely to attract lightning. In some cases, the charge may be dissipated harmlessly to ground through the electric light and telephone protectors. In others the charge may be great enough to damage the house or at least set up a current on the drop wire that will eventually result in a breakdown of insulating paper in the cable.

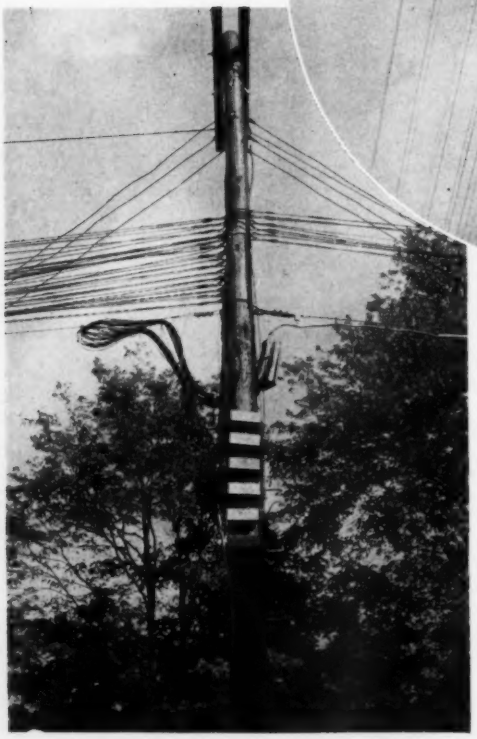
This leads us to the theory that protection to cable should be applied on the basis of the exposure to which dwellings served by wires from the cable are subjected.

If it is granted that exposure is a factor, the problem remaining is to determine just how much exposure or isolation warrants protection. Any formula set up must also be reasonably easy to interpret and administer. The writer, on the basis of having observed hundreds of lightning troubles, maintains that *cable protection is required at terminals to which are connected aerial wires leading to any exposed building.* An exposed building may be defined as an isolated structure with no other wired building nearer to it than 500 feet in three or more directions in the same horizontal plane.

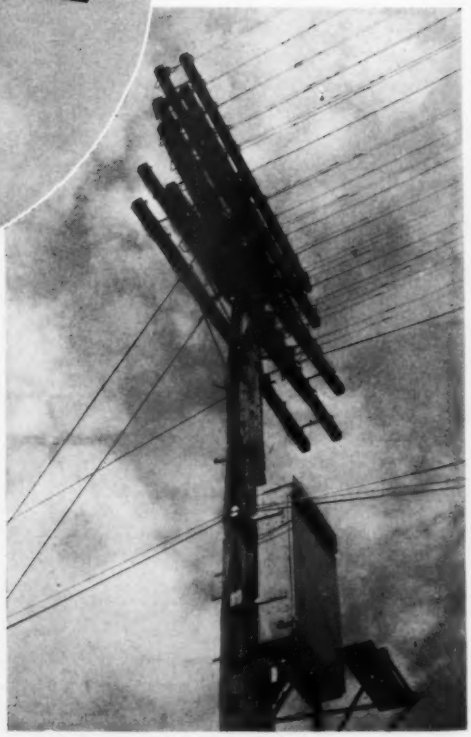
In other words, a drop wire to a dwelling which has no other wired building nearer than 500 feet, except on one side, should be protected. Since some buildings are located on side hills or on hilltops, the exposure on the same horizontal plane may exceed 500 feet even though the distance to the nearest dwelling along the ground is much less. Small groups of buildings, such as will be encountered at a rural cross road, should be viewed as one structure for the purpose of placing protection. This means, of course, that protection would be applied to practically all terminals in rural areas and much more liberally in suburbs than is now the common practice.



A good example of open wire lines connecting to underground cable.



Drop wire lines protected at cable terminal.



Protection provided at point open wire lines enter cable.

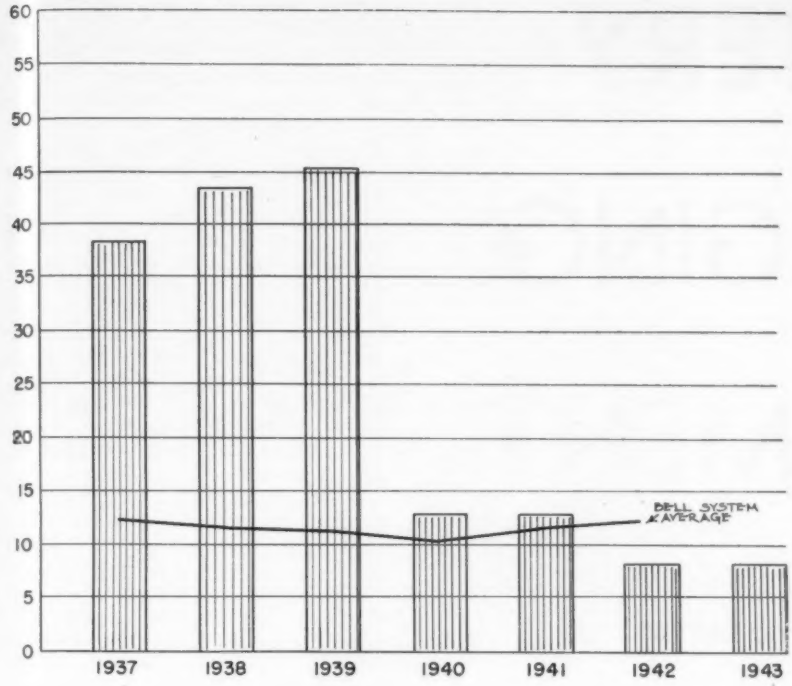


Chart I. Shows lightning trouble per 100 miles of cable sheath.

The question as to whether this method has been tried and proved is answered by results obtained on treating one central office area. The area selected had 46.5 miles of cable and the additional protection was placed in the early part of 1940 with results as shown below and in accompanying *Chart I:*

Year	*Troubles Charged to Lightning*	*Troubles Per 100-miles of Sheath*
1937	18	38.71
1938	20	43.01
1939	21	45.16
1940	6	12.90
1941	6	12.90
1942	4	8.60
1943	4	8.60

It is significant that three of the four troubles occurring in this area during 1943 were classified as "old trouble." These were inside burns which had occurred prior to 1943 and were brought in by movement of the cable during pole replacement or cable reconditioning. The one trouble remaining was due to lightning striking directly at a pole on which the terminal was located.

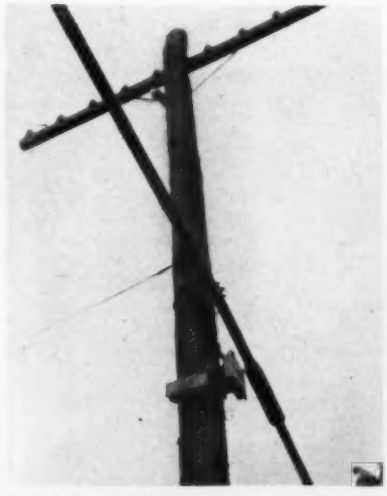
There were 153 extra protectors added to this area at the cost of seven dollars each, or $1,071. The improvement shown amounts to 14.67 troubles per year, which at the $50 figure generally used for cable repairs in the area involved would pay off at the rate of $723 each year.

A better way to view this, however, is to charge the additional protectors to the capital account and apply a 20 per cent annual charge to the $7.00 cost to care for interest on investment, maintenance, taxes and depreciation. On this basis, the carrying charges on the 153 extra protectors installed would amount to $214. This leaves a clear saving of $509 for the 46.5 miles of cable involved, or $10.95 per mile per year. This figuring of the annual cost of each protector at $1.40 per year, permits the installation of 36 extra protectors in order to eliminate one cable burn yearly.

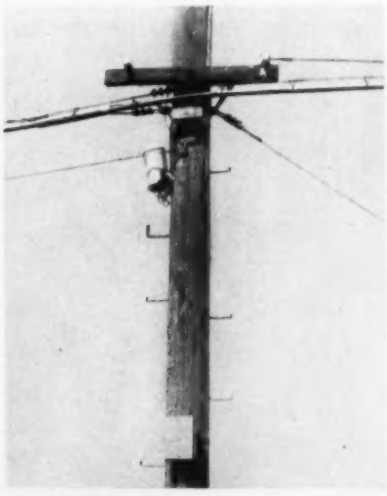
Similar results were obtained in a much larger area containing 486 miles of cable. They are not so clear-cut, however, for the reason that all of the protection was not placed in one year and there still exist some terminals that should be protected. This section is one of the worst along the Atlantic seaboard for intensity and frequency of lightning appearances. During 1943 there were recorded 32 cases where direct strokes damaged the cable, accounting for 40 per cent of the lightning trouble.

In addition, this district has an exceptionally bad history of cable burns due to fallen power wires. These have weakened the dialectric strength of the

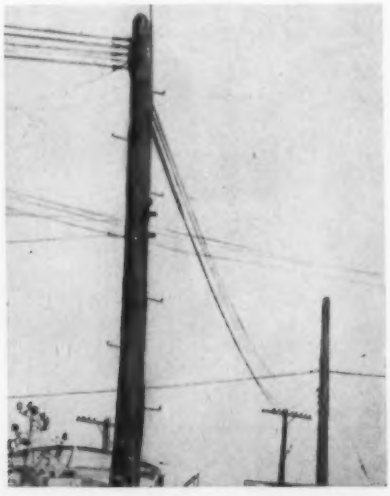
(Please turn to page 60)



Protector used in connection with an unprotected cable terminal.



A few extra protectors usually prove a very good investment.



Long drop wires should have adequate protection.

BATTERY CHARGING EQUIPMENT

By GEORGE O. TAPPER

CAREFUL selection of battery charging equipment is just as important for the smaller common battery telephone exchanges as it is for the larger exchanges. Some of the important ways in which charging equipment affects the operation of the telephone plant are at times overlooked. When selecting equipment for telephone lead acid-type storage batteries the principal items to be considered are as follows:

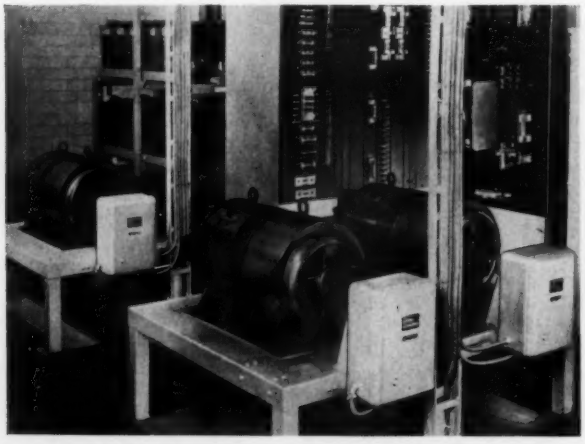
(1) Effect on voice transmission.
(2) Effect on the operation of relays.
(3) Amount of noise introduced into the telephone channels.
(4) Radio interference.
(5) Reliability of the charging equipment.
(6) Reliability of the power source.
(7) Amount of attention required.
(8) Space requirements, ventilation, personnel and fire hazards, appearance, etc.
(9) Type and charging rate of the required equipment.
(10) Annual expense for power, replacement parts, depreciation, etc.
(11) First cost.

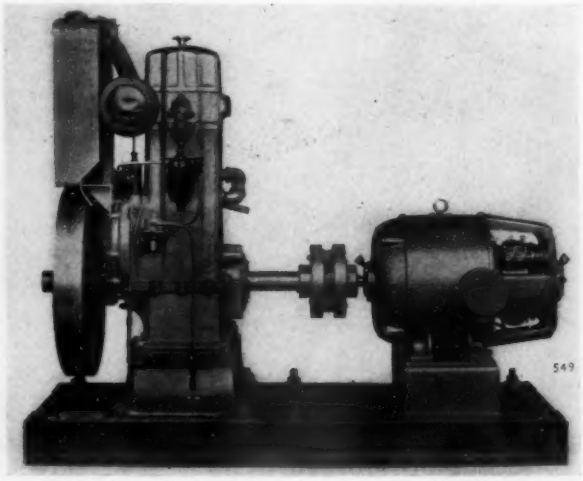
The above considerations are not necessarily arranged in order of importance as they will vary with different installations. The above considerations will be discussed in more detail in the order listed.

The telephone presents three aspects: voice transmission, switching of lines and finance. Battery-charging equipment is importantly involved in the first two. The third aspect—finance—will be left to the discussion of others as the writer has never corralled enough dollars to study them in the mass. Battery-charging methods and equipment control the variation in the transmitter current supply of the various telephones by controlling the voltage of the central office battery. When manual charging is used with an 11-cell battery the voltage range may be from 20 volts at the end of the discharge period to 29 volts during the charge. This variation will cause a corresponding variation in the transmitter current at all telephones, which results in about 1.5 db to 2 db variation in the voice frequency output of the telephones between high and low battery voltages.

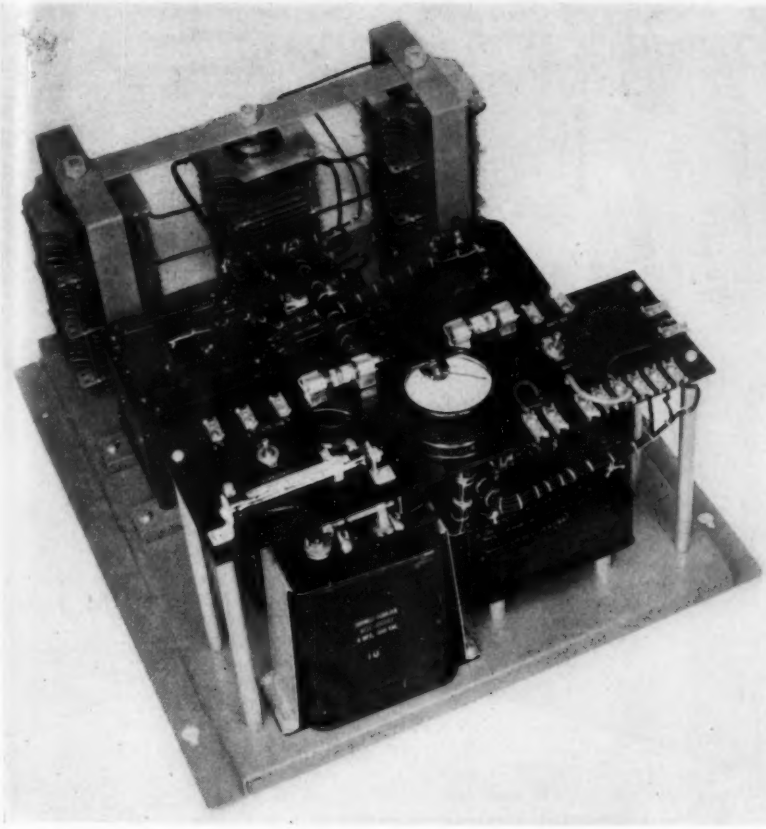
This variation is not great and will not prove objectionable in most telephone plants, however if this variation in telephone output can be reduced without much effort, it is worth considering. As the great majority of telephone plants are well planned and efficiently operated, it is not possible to point out where sensational improvements or savings may be made, but rather to indicate where small improvements may be made here and there, which, in the end, may represent a substantial gain.

Probably a more important effect of a large variation in battery voltage is excessive transmitter current on short lines while charging the battery, which results in decreased transmitter life and sometimes noisy lines. It is a good idea to check with a milliammeter the current flow in some of the shortest and longest lines at both high and low battery voltage. The voltage variation may be reduced by starting the charge





ABOVE: Diverter-pole motor generator battery charging installation.
RIGHT: Gas engine driven battery charging set.



One type of telephone rectifier for battery charging.

before the voltage drops to the minimum value and by charging the battery at a lower rate for a longer period. It is not necessary to charge a battery at the eight-hour rate.

The only requirement for charging at a lower rate for a longer period is that the battery drain plus the battery losses be replaced. The total power required to charge a battery at a reduced rate will be greater when the charging equipment is being used at a small percentage of the full load capacity, however this increased cost in practically all cases should be greatly outweighed by the improvement in the telephone service. The differences in the cost of operating charging equipment of various efficiencies will be considered in connection with annual costs of power, etc.

Too large a variation in battery voltage increases relay operational difficulties. If a cord circuit relay containing two 100-ohm windings is connected to a 750-ohm line loop (total resistance 950 ohms) which has 10,000 ohms line insulation, the current with various voltages would be:

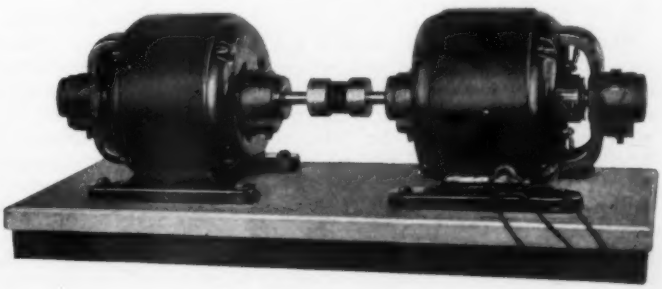
	20 volts	*24 volts*	*28 volts*
Operating current, amperes	.021	.025	.029
Leakage current, amperes	.002	.0024	.0028

The relays are, of course, adjusted to operate on minimum battery voltage and to release on maximum voltage. Allowing a factor safety the relays would probably be adjusted to operate on .018 amperes and to release on .0032 amperes. In the above 24-volt values the release value is only 9.6 per cent of the operate value, however, if the minimum and maximum battery voltages are considered, the release value becomes 18 per cent of the operating value. A release value which is too high a percentage of the operate value means a sluggish response when the subscriber attempts to flash the operator. Perhaps there will be no flash at all if the subscriber operates the switch too rapidly. With a large voltage variation, still greater relay adjustment difficulties are encountered in trunk or other circuits where the release or non-operate values are a high percentage of the operate values.

Equipment is designed to operate on the 20 to 28-volt or 40 to 56-volt limits as is usually indicated on manual switchboard circuit drawings, however, the price paid is more expensive equipment and maintenance. The makers of automatic telephone switching equipment specify closer voltage limits to avoid maintenance difficulties or unreasonable increases in the cost of the equipment. The argument in favor of equipment that will operate with a large voltage variation is that, in the event of a power failure, the battery voltage may become low. Present-day commercial power failures are usually of short duration; when necessary, a gasoline engine-driven generator for standby power will definitely solve that problem.

As the charging methods determine the battery voltage variations, it may be well, before proceeding further, to discuss the various battery-charging methods. Any battery voltages, charging rates, etc., mentioned in this article are not intended to replace any instructions of the various manufacturers, which may be different.

Constant Current Charging: The eight-hour discharge rate of the battery is usually considered as being the best constant current rate at which to charge the batteries in the shortest period of time without the rate being excessive toward the end of the charge. Any charging method in which the current is held constant is known as a constant current charging method regardless of the charging rate or length of time of the charge. Some of the so-called constant current chargers, strictly speaking, are not constant current chargers as the current tapers off near the end of the charge. However, the constant current designation is used as the current is constant during the greater part of the charge. This reduction or tapering off of the charging



Another type of charging motor generator set.

current is desirable as excessive gassing and excessively high battery voltages are prevented. Excessive gassing is blamed for knocking the active material off the plates. The extreme battery voltage limits will be close to 1.75 volts per cell at a completely discharged condition and 2.62 volts per cell near the end of the charge. This will be about 19 to 29 volts for an 11-cell battery. This voltage range of 10 may be reduced to two, three, or four volts. The lower limit may be raised by starting the charge before the battery is practically discharged and the upper limit may be lowered by charging with less current for a longer time and with more taper to the charge.

Constant Voltage Charging: A constant voltage is applied to the battery and this voltage is maintained throughout the charge. The amount of charging current is determined by the difference between the charging voltage and the battery voltage, therefore, the charging current will decrease as the charge progresses due to the increasing battery voltage. This method is useful in an emergency when it is necessary to charge a battery in a short time. The maximum charging rate for a particular battery is usually determined by the number of ampere-hours that have been discharged from the battery.

As an example, the charge of a 100-ampere-hour battery may be started at 100 amperes if the battery is completely discharged. If it were one-half discharged the charge may be started at 50 amperes. The charging current should be reduced one ampere for each ampere-hour charge the battery receives. At 100 amperes charging current, the battery would receive one ampere-hour in 36 seconds, however, it is not necessary to manually reduce the current every minute or so as the rising battery voltage will reduce the current if the charging voltage is held constant. The maximum starting rate may be greater or less than the above figures because, in addition to the ampere-hour capacity, the rate also depends on the porosity of the plates (which means the amount of active plate material in contact with the electrolyte) and the porosity of the separators.

These two items largely control the internal resistance of a battery, which, in turn, determines the heating effect of the charging current. It is not necessary to know all the internal details of the battery if the constant voltage is adjusted so that the temperature of the electrolyte and plates does not exceed 110 to 113 degrees F. and only normal gassing occurs. A battery can be safely charged to over 90 per cent of full charge in two to two and one-half hours. A good value to try at the start of the charge is two and one-half volts per cell. Remember the temperature limits which must not be exceeded are: 110 to 113 degrees F. and only normal gassing at any temperature. Constant voltage charging may, of course, be used for charging at any rate from a trickle charge up to the limits given above.

Another type of telephone rectifier for battery charging.

Step Charging: This method, as the name implies, consists of changing the charging current in definite steps instead of the gradual changes of the constant voltage method. Step charging can be used for starting a charge at a high rate when constant voltage equipment is not available—as an example, when using improvised equipment to charge a battery rapidly during an emergency.

Combination Constant Current and Constant Voltage Charging: If the current of a constant current charger tapers off near the end of the charge, it means that a limit has been placed on the charging voltage. Therefore, the charger has some characteristics of constant voltage regulation towards the end of the charge. Most so-called constant current charges are constructed to provide this feature. If the voltage of a constant voltage charger rises as any part of the charge progresses, it has some characteristics of a constant current charger. It is desirable to limit automatically the current at the start of a constant voltage charge to a value safely within the capacity of the charger.

Trickle Charging: This method consists of charging the batteries continuously at a rate sufficient to compensate for drain and battery losses. A trickle charger may be arranged for constant current or constant voltage or a combination of the two. The word "trickle" specifies a rate relative to the size of the battery. The normal eight-hour charging rate of a small battery would be just a trickle in a large battery. Any charger may be used as a trickle charger by reducing the charging current to the required value, however, it usually is more economical to use a small charger for this method than to operate a large charger at only a small percentage of full load. Frequently a worthwhile saving may be realized by shutting down the larger charging equipment during periods of light load and using a trickle charger.

Float Charging: In this method all current requirements of the load are supplied by the charging equipment. The battery is a standby for use in the event of a power failure. If 0.5 ampere

is the amount necessary to replace the battery losses, the charger output should at all times exceed the load by 0.5 ampere. If the load has high peaks of short duration, it may not be desirable to fully float the batteries; part of the peak load may be supplied by the battery. The amount which should be supplied by the battery depends upon the minimum voltage allowed and the size of the battery. A fully charged battery will start to drop below two volts per cell after being discharged at the eight-hour rate for approximately three hours. At the six-hour rate the time would be about two hours. Of course, we know that the less a battery is discharged each day, the longer it will last. One study on this subject gave the following figures:

Daily discharge.	*Battery life.*
10% of battery capacity..	10 years
20% of battery capacity..	8 years
40% of battery capacity..	6 years

The voltage limits per cell should be about as follows (for full floating): 2.10 to 2.20 volts for 1.210 specific gravity cells and 2.17 to 2.27 volts for 1.280 specific gravity cells. Automatic charging equipment that will maintain these limits is available.

End Cells: In some automatic telephone installations having a 23-cell battery, three end cells are used which are automatically cut in when the voltage drops to 46. As the end cells are not discharged as much as the regular cells, a separate trickle charger is provided, however, the large capacity charger is arranged so that the end cells may be charged at a higher rate when necessary.

Counter Electro-Motive Force Cells (C.E.M.F. Cells): These cells are used in the discharge leads of batteries to reduce the voltage across the discharge leads when charging the battery at a rate which would cause an excessive voltage at the telephone switchboard. The C.E.M.F. cells also may be arranged to cut out automatically one at a time as the battery voltage drops during discharge.

Equalizing Charge: Even with all cells in good condition the voltage of some cells will drop lower than others, due to larger internal discharge or losses. This condition is caused by local action due to the impurities in the cells. As the amount of impurities will not be exactly the same in all cells, the internal losses will, of course, not be the same. Even though this difference is slight it will, in the course of a few weeks or months, cause some cells to be in an undercharged condition. If a charge is continued long enough to fully charge the low cells, the other cells will be overcharged, thus shortening their life. Another objection to this overcharging is that the discharge voltage may be excessive. Too high a voltage is very objectionable in the case of 48-volt offices as the arcing at contacts in the telephone equipment becomes excessive above 56 volts. The provision of a low voltage charger for giving low cells an individual charge is worth considering.

The next item to be discussed is the extraneous noise in telephone channels caused by battery chargers. A charger, while in use on telephone batteries, should be equipped with a suitable filter to reduce the noise or ripple voltage to an acceptable value. One value frequently specified for rectifiers is that the ripple voltage (AC component of the DC output) shall not exceed 0.1 per cent of the DC voltage. Sometimes a ripple of .040 volts is permitted on a 24-volt battery charger. It is difficult to assign a definite noise voltage limit unless the voice frequency components present in the noise are also limited in value. Telephone receivers are from 100 to 1000 times more sensitive at the important voice frequencies than at 60 cycles, therefore, a noise voltage value, which would not cause an objectionable noise at 60 cycles, may cause excessive noise at a higher frequency. To avoid complications in specifications, the safest course is to purchase chargers built by manufacturers experienced in telephone requirements.

The prevention of radio interference should, of course, be considered because battery chargers, like all other equipment of this nature, has been the cause of man-made static—at least our radio friends claim that:

"Motor-generator sets cause whirring-crackling - buzzing - humming - droning-whining sounds.

"Rectifiers cause violent, heavy buzzing or rushing sounds.

"The make-and-break contacts on automatic chargers cause clicking sounds.

"The ignition apparatus on gasoline engine standby power plants cause a heavy, violent buzzing sound, usually of short duration."

Responsible electrical manufacturers realize the problem and have adopted ways and means to reduce the radio interference qualities of their equipment.

The reliability of the charging equipment will depend on the quality of the design, the material and workmanship and also the rapidity with which replacement parts may be obtained and installed. The reliability may be judged by comparisons with similar equipment, the reputation of the manufacturer, the accessibility of parts that may require replacement and whether replacement parts and complete units are stocked in convenient locations. Reliability is especially important where the charger is operated continuously in floating or trickle charging batteries.

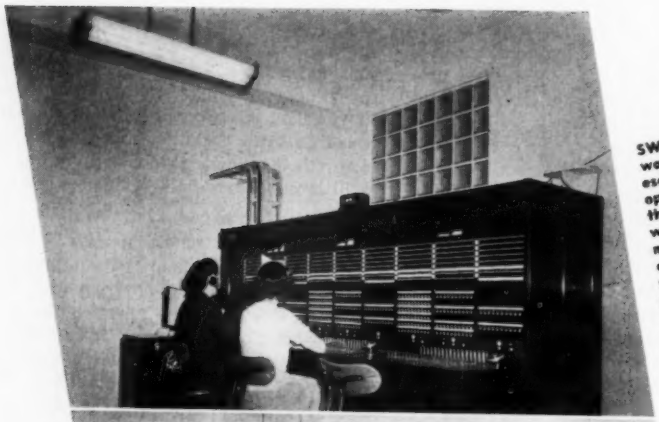
Reliability may be increased by a designer who: (1) allows an ample factor of safety by providing wire of a sufficient size to prevent the overheating of coil windings; (2) does not operate the iron cores of coil windings at too high a magnetic flux density; (3) uses filter condensers which are designed for an ample working voltage; (4) specifies high quality insulating compounds and the proper methods for impregnating the coil windings, and (5) provides means to prevent excessive arcing at the relay and switch contacts of automatic chargers. There are a thousand and one other points to be considered by a good designer such as the proper bearings, brushes and the lubrication of rotating machines. Of course, all this costs more money, but it is justified because the charging equipment is the heart of the telephone power plant.

The reliability of the power source will influence the choice of equipment. If long interruptions may frequently be expected it will not be practical to operate with close battery voltage limits. Under these conditions trickle charging will not be sufficient since it will be necessary to charge at a higher rate to bring the battery voltage back to normal when the power is restored. If the voltage variation is great, it will cause greater charging current variations with some types of equipment than with other types. If there are sudden changes in power voltage, such as is caused by the starting up of large motors nearby, this may cause surges that will puncture coil insulation and break down condensers in equipment that is not properly designed and built. Such conditions do not occur very often, but when they do exist the supplier of the charging equipment should be so informed, because even with the best of equipment, trouble may be encountered under such conditions. In such cases, it may be desirable to install a large capacity electrolytic condenser across the output terminals ahead of the filter circuit. This arrangement is especially desirable to prevent failure of rectifier bulbs due to lightning, high voltage surges or fluctuations in line voltage. The electrolytic condenser should be a puncture-proof and self-healing type.

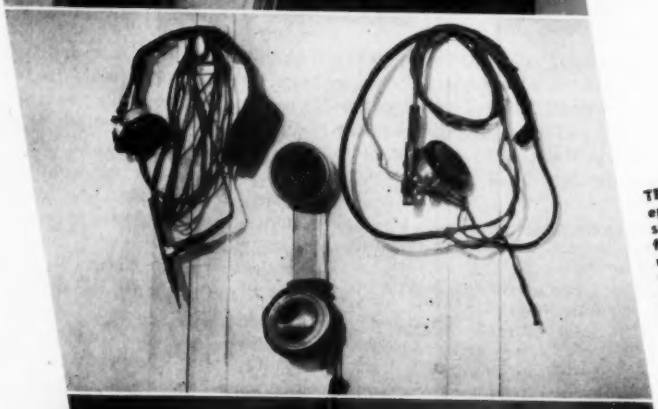
The amount of attention required by the various types of charging equipment is usually not an important item. With rotating equipment, maintenance consists of lubricating, cleaning,

(Please turn to page 62)

TELEPHONE KINKS



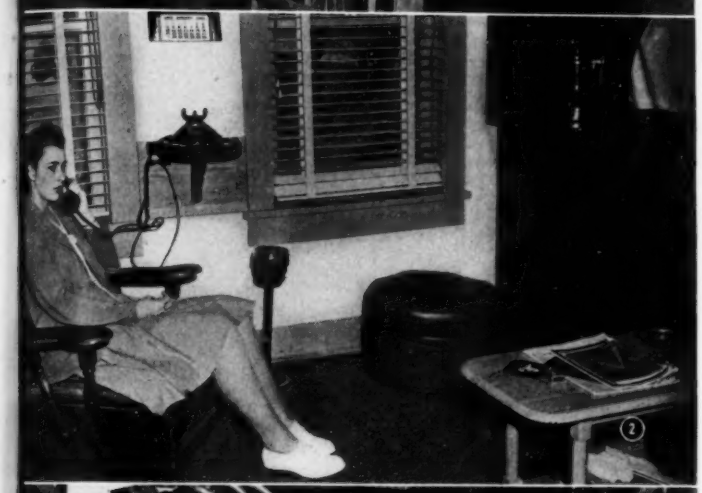
SWITCHBOARD LIGHTING. After the war, greater use will be made of fluorescent lighting in manual switchboard operating rooms. This type of light is the nearest approach to heatless light we have ever enjoyed. It is also economical and, when properly placed, in a switchboard room will not cast shadows. A typical fixture suitable for switchboard use is shown. This room is air-conditioned and the glass brick inserts used instead of windows reduces the dust hazard considerably.



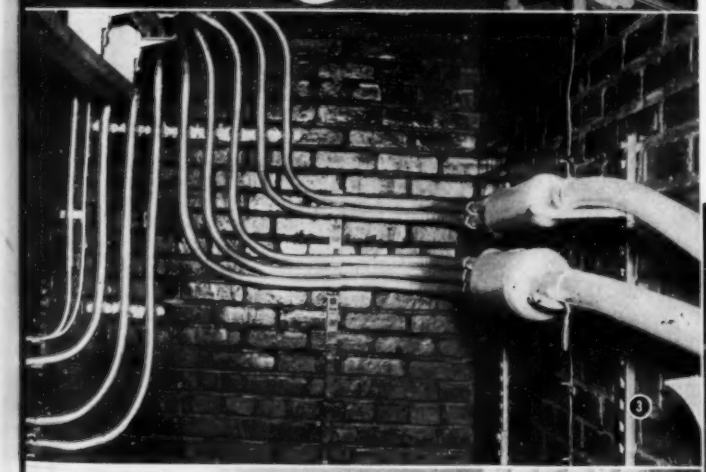
TEST RECEIVERS are useful in any telephone exchange, for instance, in cable splicing. One receiver with a small flashlight battery in series can also be used to advantage. All receivers of this type should be equipped with test points and clips. Approved types of test receivers are shown in the accompanying photograph.

HANDY STOREROOM TRUCK. This idea was furnished by Bob Miles of the Kansas City (Mo.) branch of the Kellogg Switchboard & Sapply Co. This type of inexpensive truck will be found extremely useful and convenient in any telephone repair shop or storeroom. If properly used, it not only saves many steps but also protects delicate material and equipment.

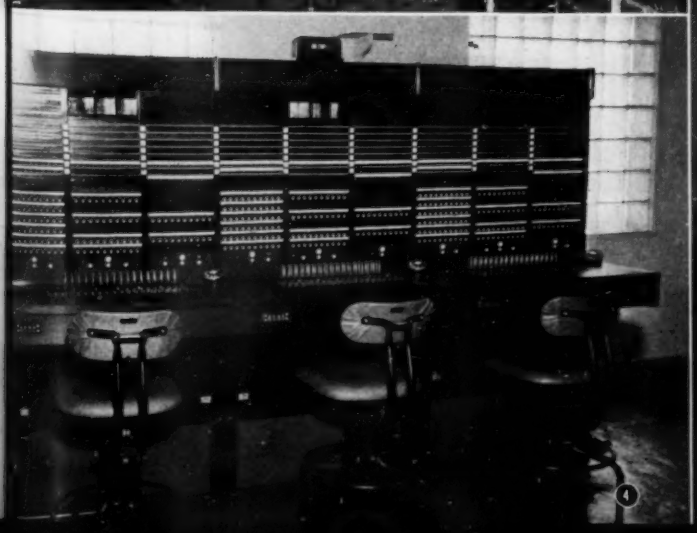
1. **SWITCHBOARD ADDITION INSTALLATION.** This photograph shows a two-position addition being installed on a busy switchboard without interrupting service. This is a common occurrence on many busy wartime switchboards.



2. **OPERATORS' RESTROOMS.** Attractively furnished and well-equipped operators' restrooms will pay large dividends for any telephone company. It often has been proved that operators do their best work when they can have a few minutes occasionally to relax. Relaxations always come easier in a comfortable room. The accompanying picture shows one example of a well-furnished operators' restroom which may be made available by the average telephone company.

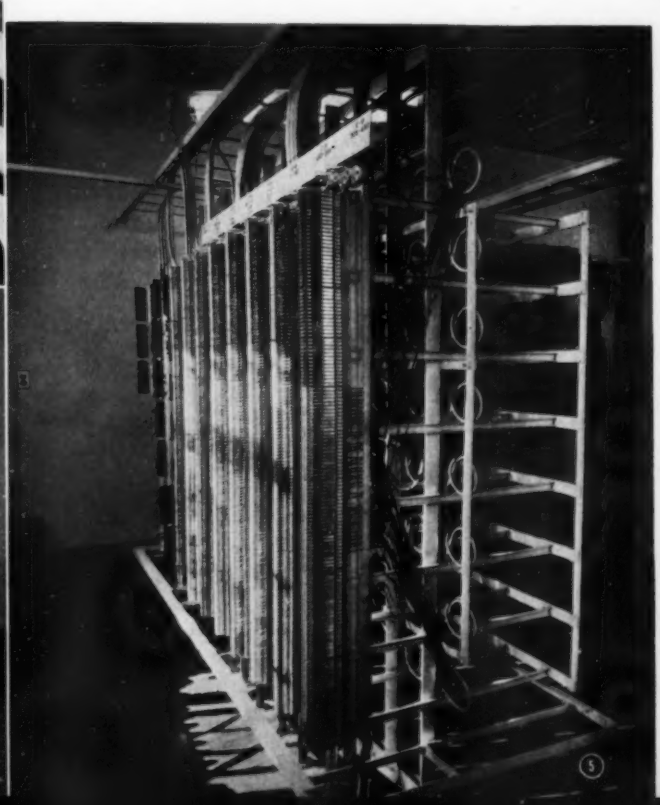


3. **THE CABLE VAULT.** The design of a cable vault should be such that no cables cross but all may be easily traced if desired. Such an arrangement is clearly shown in the accompanying photograph.



4. **SWITCHBOARD CHAIRS.** It is well to provide a good operator's chair for each position at the switchboard even though they may not all be in constant use. These extra chairs can be used for replacement and in the event of an emergency when extra operators must be rushed on the job. A very satisfactory arrangement is shown in the accompanying photograph where a maximum of two operators is all that are generally used. Note also the speedometer type clock mounted on top of the switchboard.

5. **MAIN FRAME PROTECTING RAIL.** Main frame protectors are often damaged by workers accidentally bumping into them. Much of this trouble may be avoided by installing a guard rail as shown in the accompanying picture. It will be noted that this rail protects the horizontal side of the frame as well as the protectors.



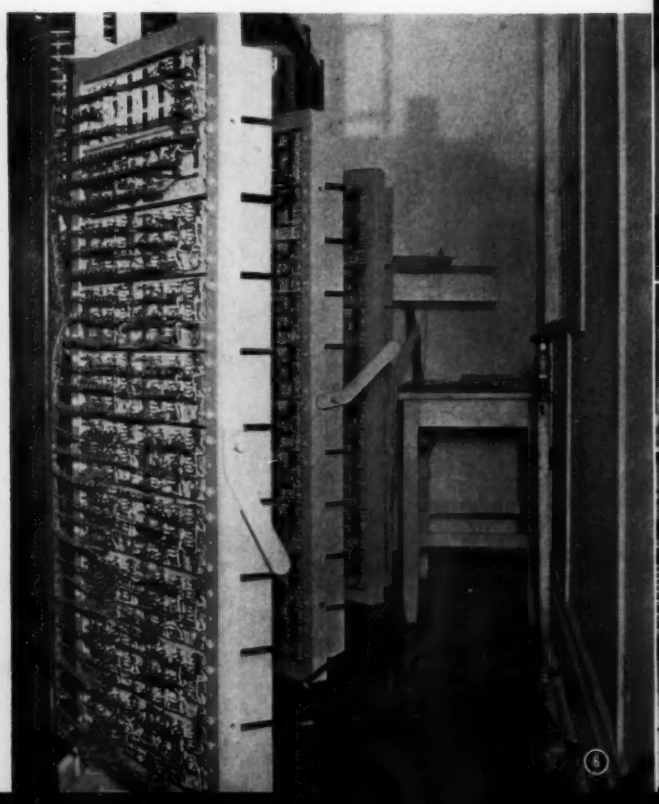
6. EXTENSION POWER CORDS. Good, safe extension cords are necessary for the proper maintenance of any telephone exchange. Such cords are necessary for extension lights and soldering irons as shown in the accompanying photograph. Suitable holders should also be provided for these cords to care for them when not in use.

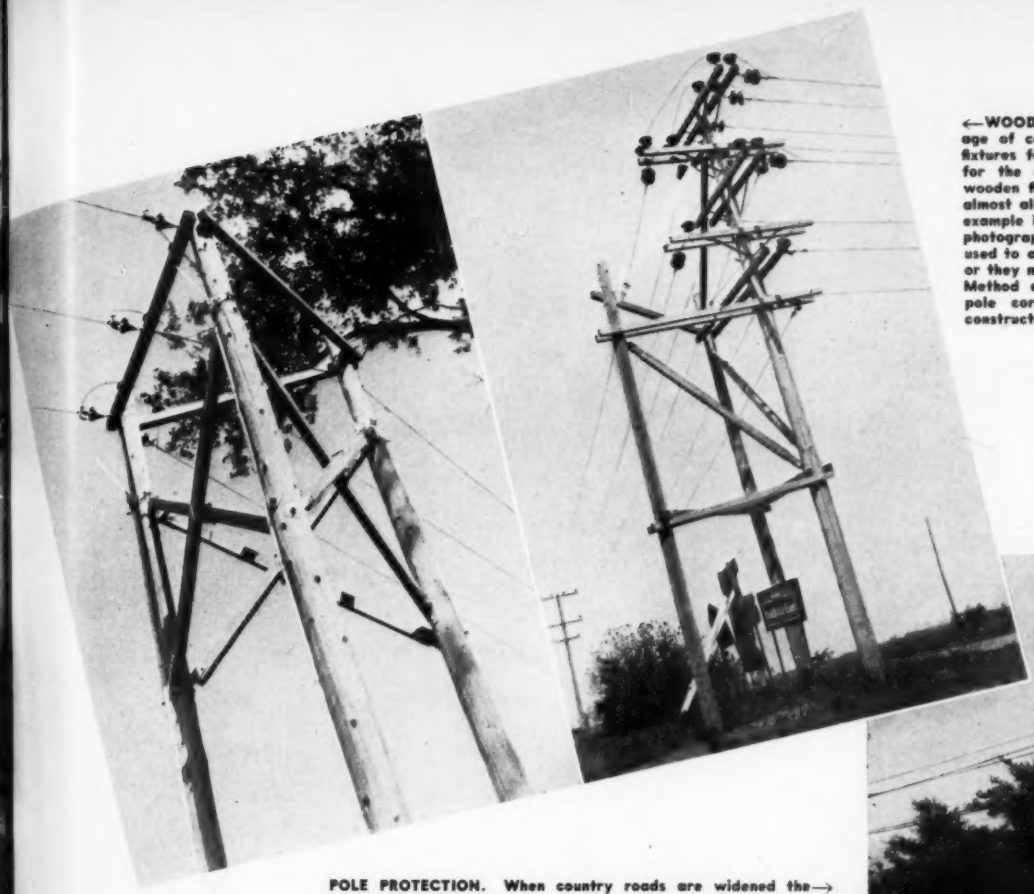
7. SUPERVISORS' CHAIRS. Due to the present-day metal shortage, wooden operators' chairs are again in common use as indicated in the photograph. Attention is also invited to the supervisors' chairs shown, which were fabricated principally from plywood by one resourceful telephone man.

8. AIR HAMMER TOOLS. The air compressor for use in the operation of certain tools, such as drills and pavement hammers, may be used to advantage when conduit must be installed under existing pavement. When a large amount of work of this nature is to be performed, the compressor is usually mounted on a special truck. For the occasional user the compressor mounted on a trailer is generally considered satisfactory. A small compressor mounted on a two-wheel trailer is shown in the photograph.

9. NOVEL STORAGE BATTERY INSTALLATION. The accompanying photograph shows a 48-volt storage battery installed for powering a large PBX switchboard. The battery, due to necessity, had to be installed near a passage-way, hence the protecting rail. Note the gate opening in the rail at the corner.

10. EQUIPMENT CABINETS. The trend of telephone equipment design seems to be toward enclosure of all delicate parts in steel cabinets, and great use is likely after the war when critical materials are again available. This seems a good idea as this arrangement provides both dust and mechanical protection. The accompanying photograph shows automatic switching equipment enclosed in one of these steel cabinets.

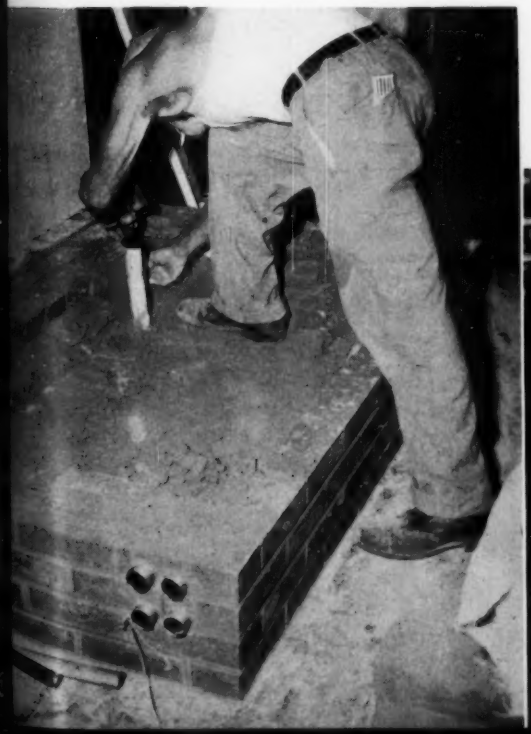




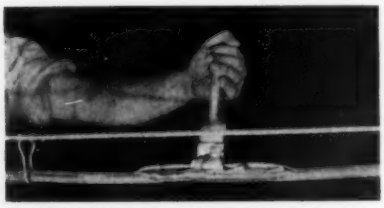
←**WOOD POLE FIXTURES.** Due to the shortage of certain critical materials, metal pole fixtures for telephone use will be unavailable for the duration, in most cases. However, wooden fixtures may be used to advantage on almost all types of telephone construction. An example is indicated in the two accompanying photographs. Special metal fixtures may be used to attach the wooden braces to the poles or they may be bolted directly in place. **LEFT:** Method of using special fittings on a three-pole corner. **RIGHT:** A three-pole corner constructed without the aid of special fittings.

POLE PROTECTION. When country roads are widened the grading operations often seriously weaken poles in important telephone lines. Also, it is sometimes impossible to move these poles to a safe location. The photograph indicates how one such pole was strengthened by concrete, to avoid moving. It will be noted that this is an aerial to underground pole and moving of it would prove extremely expensive. →

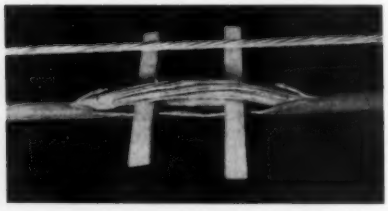
GENERATOR MOUNTING. If the expected life and service is to be obtained from rotating machinery such as generators and ringing machines, they must be properly mounted. This means a solid and level base that will be vibration-free. Such an installation is shown in the two accompanying photographs (below) where brick piers are used. Concealed conduit is installed which adds considerably to the appearance of the installation.



Special tools used in arc set for cable repairs.



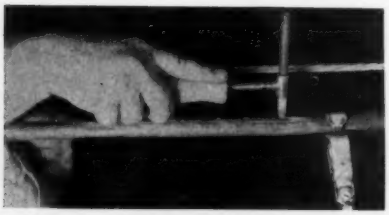
Opening cable sheath with special arc tool.



Cable sheath opened with special tools.

Closing sheath after repair by use of tool.

Cable repaired and sheath ready for closing.



Carbon arc tool used in making cable repairs.

CONSERVING CRITICAL MATERIALS

By RAY BLAIN
Technical Editor

CONSERVATION of expensive materials is not new in the Independent telephone industry. Due to the necessity for economy, Independent manufacturers in the past have found it extremely necessary to make extensive and systematic studies to discover suitable materials which would prove satisfactory to replace those more expensive and critical required in the fabrication of telephone apparatus. Added to this, progressive Independent operating companies have discovered numerous modifications in operating and engineering practices which have effected still greater economies.

The above mentioned activities definitely fit into the war emergency program and assist materially in successfully solving the numerous difficult problems which arise daily in these trying times. To be more specific, the Independent telephone industry these days may be likened to the legendary canine pet of Old Mother Hubbard for certainly the cupboard was never more bare. Equipment which has outlived its economic usefulness must from necessity be continued in service, perhaps for some time to come. Wire and cable are being reused at an economic loss. Plant additions are being made only when forced by wartime necessity and then they are engineered only to meet the immediate needs rather than for longer and more economical periods.

Wartime activities have increased the traffic loads on our facilities to such an extent that, in many cases, service has been materially affected. To add to our difficulties, trained operators, because of higher wages and the numerous attractions of working in war plants, have not in all cases been available. This has also increased the burden of operating companies.

In this short article an attempt will be made to suggest various means of making even greater use of what we have and of making plant last longer. Even though they may not, in all cases, prove most economical they are necessary due to the emergencies of war.

Central Office Equipment: The practice of routine or preventive maintenance and special care will permit longer service without replacement of such items as multiple jacks, keys, cords, wipers and commutator brushes. Greater wear must be permitted on these items than has heretofore been tolerated. Switchboard cords should now be permitted to become more soiled and frayed being replaced than has been considered desirable. This is not an overly serious condition if the cords are rebutted when necessary to keep them in good condition from a service standpoint.

The useful life of relays will be extended considerably if they are properly maintained. Only approved tools should be used in making adjustments and care should be exercised at all times so that the precious metal contacts will not be damaged.

Main frame jumper wire should be sorted carefully and saved for reuse. Care should be observed when working on main frames so that protectors will not be damaged.

Meters of all types are extremely critical due to the large numbers being required for the use by our armed services. Careful maintenance and use of the ones now installed in the average exchange will insure their life for the duration.

Subscribers' Station Equipment: It may hurt our pride, but we are no longer able to replace subscribers' telephone sets because of poor appearance

if they are continuing to give good service. Often minor repairs can be made on the job which will permit a retention of a particular instrument in service. Worn cords may often be repaired by the use of acetate cloth tape without the cords being removed from the set. The use of extra long desk stand cords has been discontinued by most companies except in a few special cases. Some types of retractable cords have been discontinued, however, suitable cords of this type may now be procured and often they prove a real economy. Flat rubber wire for use under rugs is definitely out for the duration, and other types must be substituted. The tin coating for inside house wire also is out for the duration, if not forever. Reduction of protection on substations, where there is the slightest possibility of lightning or power crosses should never be considered. The installation of protectors is only insurance against serious damage of expensive equipment and a reduction in its use would only increase the possibility of a greater cost, plus service interruptions.

The life of drop wire may often be prolonged by painting the outer surface with a protective coating without removing the drops from service. A special machine has been developed for this purpose which is proving entirely satisfactory. [A special drop wire paint and painting machine is described on other pages of this issue.] Short lengths of drop wire may be spliced together by the use of compression-type sleeves in order that old recovered stock may be reused.

The necessity of a well-equipped repair shop should be given serious consideration for wartime use in the average telephone exchange. When a good shop is available many repairs can be effected which will keep old equipment in service far beyond its normal life span. When such a shop cannot be maintained or when the amount of work required would not justify a shop, then arrangements probably can be made with one of the companies who specialize in the rebuilding of telephone apparatus to handle your work.

Exchange Cable Plant: Changes and the clearing of trouble in the cable plant no doubt represents a most difficult wartime telephone problem. This is because of the shortage of necessary materials, also a terrific shortage of qualified cable splicers. Because of these handicaps careful planning is necessary if we expect to make the old cable plant last without major rehabilitation until men and materials are available again.

All cable troubles should be analyzed carefully and accurate records maintained over extended periods of time. This usually will indicate that there are certain weak points in the cable plant which cause the greater part of the trouble. This may be due to inadequate protection where certain long aerial lines enter a cable terminal or to short sections of extremely old cable which should be replaced. Changes in the count can often be made in lateral cables and terminals to provide maximum possible use of available facilities to meet additional service demands. Changing of working lines in terminals from one pair to another often permits greater use of cable facilities with some multiple arrangements.

In normal times it might not be considered desirable to open a splice or splices to clear one or two cable pairs but at the present time this may be on the "must" list. It also may prove desirable in some cases to install cross connecting terminals between main and distribution cables so that a higher percentage of pairs may be utilized in the cable system.

When additional facilities must be provided in a certain area the present cable may be reinforced by an additional small cable suspended from the same messenger by extra long rings. This will require less material and labor than would be required to replace the present cable with one of a larger size.

Old cable which normally would be replaced because of its condition may now have to be repaired and continued in service. The carbon arc cable repair kit may be used to advantage on many such repairs. When a splice must be made, the Victory joint, which reduces the solder requirement over 60 per cent, should be used.

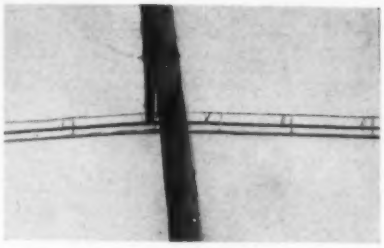
When new wartime exchange cable plant is engineered, the signaling limit of central office equipment usually is considered and, if necessary, reasonable transmission deficiencies are permitted. These deficiencies may be overcome, at least to some extent, by the use of modern high gain station equipment. This engineering takes advantage of the finer gauge cables such as 22, 24, 26 and in a few cases 28-gauge conductors.

When old cable is removed from either aerial or underground plant, extreme care should be observed so that it may be reused. Duct splices should be made so that short lengths of recovered cable may be reused in underground construction.

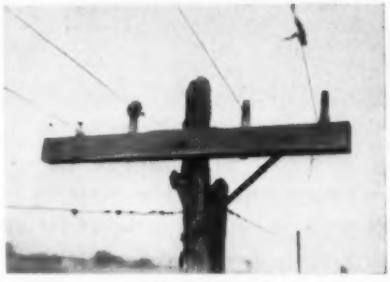
Open wire lines: Copper is still extremely critical and should be conserved when possible. In most cases copper-clad steel may be used as a sub-

(Please turn to page 64)

A splice like this is certain to cause trouble.

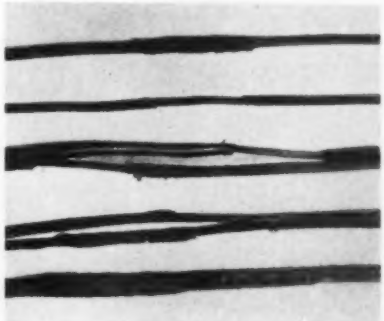


Two cables suspended from one messenger.

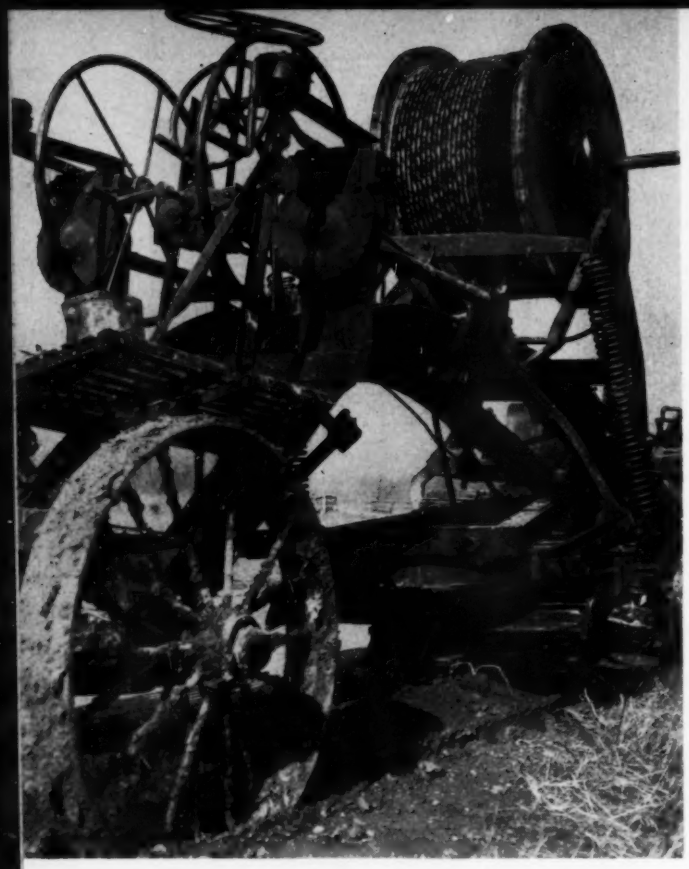


A case where insulators should be installed.

The spinner method of cable suspension.



Compression sleeves ideal for drop wire repairs.



IMPROVISED CABLE PLOW

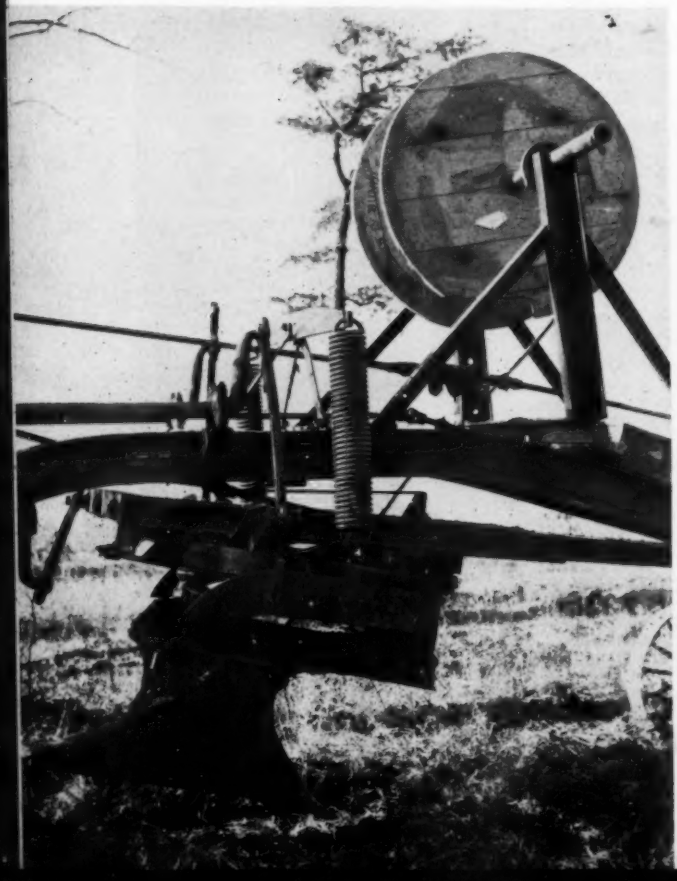
THE SIGNAL Corps personnel at Edgewood (Md.) Arsenal, under the direction of Maj. John H. Berryman with the assistance of the Third Service Command, Signal Officer Lt. Col. H. Miller and Chief Engineer H. C. Starkweather, devised the cable plow arrangement indicated in the accompanying photographs. The plow was constructed by mounting a hand-type cable plow on the bracket which normally holds the blade on an old road-grader. The controls which formerly controlled the blade now regulate the depth of the plow.

This cable plow is unique in that the cable reel is mounted on the plow itself instead of being hauled on a trailer. This design appears to have certain possibilities.

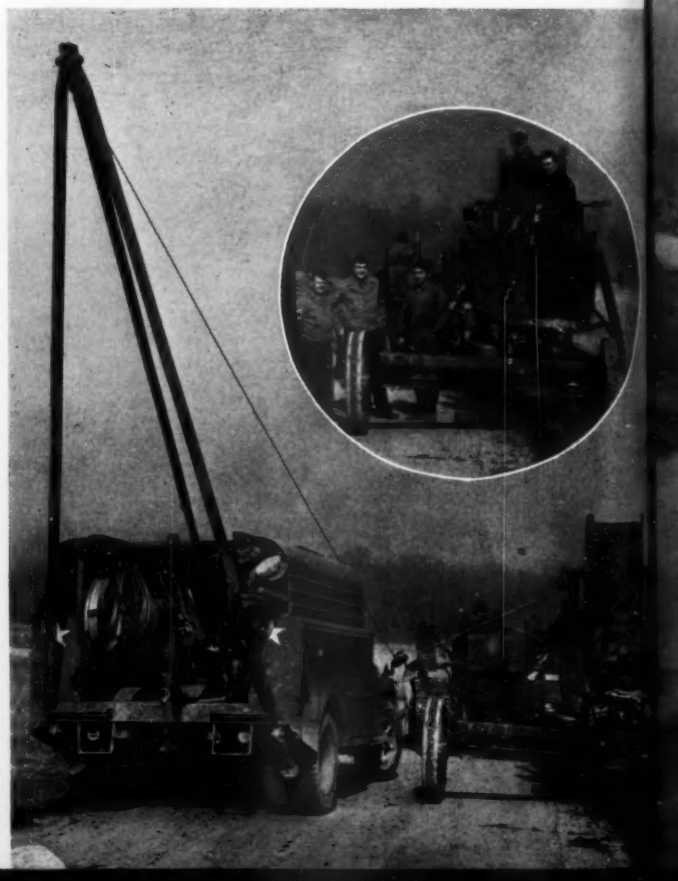
Twenty-six pair, tape-armored, jute-protected cable can be buried with this plow to a depth of 20 inches, and an effort is being made to modify the plow so that it will handle cables of larger sizes.

The trench is closed by following the cable plows with the tractor tread. The winch-line balancing method shown is required only when cable is being plowed in on the round shoulder of a road.

ABOVE: View of the improvised cable plow showing the reel mounting. The reel shown carries one-half mile of tape-armored cable. BELOW: Close-up view of the plow point.



The cable plow in action. Circle inset shows the Signal Corps cable construction crew.



This view of the cable plow in action shows the winch line from the construction truck being used to balance cable plow on round shoulder of road.

MAJOR JOHN H. BERRYMAN (right) and MASTER SERGEANT COX inspecting the work of the cable plow.

THE PLANT MAN'S NOTEBOOK

BY RAY BLAIN • TECHNICAL EDITOR

TEST connectors often save considerable time, but they also cause frequent trouble. The bolt-type connector, if properly installed and protected from the weather, can be used to advantage for test purposes. When a test connector is not desired, wires may be deadened in both directions and a short sleeve of the compression type used to join the ends. A new sleeve must be used each time the line is opened for test. If care is exercised and if sufficiently long ends are left the line may be opened many times before the wires become too short to splice.

We are of the opinion that a portable wire chief's test set could be used to advantage by troublemen in the field. The ordinary test set can be equipped with a voltmeter, control keys, and a dry cell test battery so that a trouble-man can make accurate tests and determine the nature of troubles on the line. Such a test set is used by the Army, but to the best of our knowledge it has not been used extensively by commercial companies.

* * *

There seems to be a probability that iron and cement poles may be used in greater numbers in the post-war period. The main objection raised in the past to the use of poles other than wood for telephone purposes has been their weight and the inconvenience to linemen working on them. Modern equipment, such as line construction trucks equipped with pole derrick and winch, has removed much of the difficulty of handling. Progress has also been made to facilitate working on poles of this material. The Pennsylvania Railroad uses iron poles on all its electrification with apparently complete success. While we personally doubt that anything more suited to telephone needs than a creosoted pole of wood will ever be found, there is a possibility that, due to the shortage of timber, we may be forced to use concrete or iron poles on certain types of lines. Surely no harm can be done by thinking of their possibilities in advance. Iron telephone poles have been used extensively in numerous foreign countries.

* * *

It is doubtful if we of the telephone industry have taken as much advantage of the use of lock-washers as we should. Certainly, numerous cases of trouble have been caused by nuts working loose on pole fixtures. Many of these faults could unquestionably have been prevented by the use of lock-washers of an approved type.

* * *

Did you ever stop to consider the large amount of time lost in making change on street cars, busses, etc? Everything stops while a lady fumbles in her purse to find some coins and then to get correct change to drop in the box. The pass system used in Washington, D. C., and other cities improves this condition considerably. In this city these passes cost $1.25 and are good for one week. They are simply flashed at the conductor when entering a street car or bus and eliminate the bother for transfers.

* * *

A public address system has been installed in the huge congeries of buildings in Washington, D. C., used by the Navy Department so that the announcer's voice will reach every nook and cranny. When there's some really good combat news—such as the carrier task force raid on Truk—it is passed on promptly to all personnel in the buildings via the public address system or "The Bull Horn" as it is known on shipboard. Undeniably, this means of communicating instantly with all personnel of a large establishment presents numerous advantages. Just think what it would mean in the event of disaster, such as fire. It is hoped that telephone companies will promote public address service for their customers in the postwar period.

* * *

When a reporter makes use of his pet two-dollar words in describing technical subjects, with which he is not familiar, the result is often amusing. The following is taken from a press release reporting a new telephone central office installation:

"The multiple board is composed of two sets of three identical boards, enabling more than one operator to handle a rush of incoming or outgoing calls on the same board. The heart of the exchange is an equipment frame room where an intricate maze of heat coils, terminal strips and fuses receive the electrical reaction of voices from both ends of the lines. Condensers distribute the voltage evenly through line relays and other pieces of apparatus whereby the operators receive the signals. Wires are joined and earphones rarefy the sounds so that they become audible to the listeners.

"The exchange is fed by the voltage from 12 batteries which supply the power which generates the working machinery. The frame room contains a repairman's communication test set which permits a break in the line without interfering with the switchboard.

"More than 7,000 telephone communications are made every day. Two teletype machines are likewise operated through the exchange permitting confidential communication without conversation."

The above reminds the writer of one

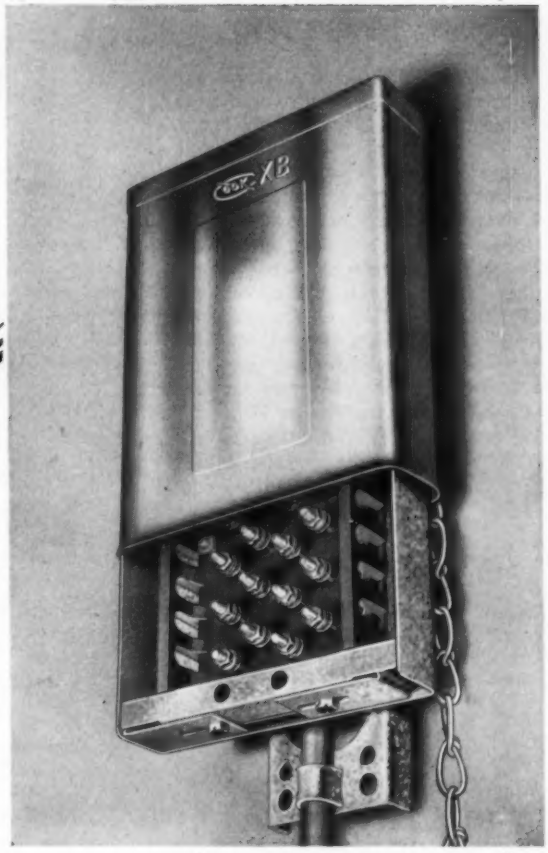
TYPE

XB

CABLE TERMINAL

by

COOK



SAVES THROUGH LESS INSTALLATION TIME AND LONGER SERVICE

The Cook XB Cable Terminal (unprotected) is available in 6 to 26 pair sizes, and offers many important advantages in construction, wiring features, maintenance savings and installation characteristics. Patent metal guards exclude snow, rain, dirt and insects at the drop wire openings. The patented plastic faceplate and insulated fanning strip are molded in one piece. Raised stud mountings eliminate surface leakage. Patented cable entrance and cable holding sleeve provide secure and tight cable joint. The compound is completely filled by an exclusive moisture-proofing process that insures against shorts and grounds by permanently positioning the cable pairs. Heavy reversible zinc hood permits mounting with stub from either top or bottom.

"For the best in protection and distribution—reach for the Cook catalog."

COOK ELECTRIC Company

Telephone Protection & Distribution Engineering Since 1897

ARMY E NAVY

2700 SOUTHPORT AVENUE • **CHICAGO 14, ILLINOIS**

time long ago when a student installer, while conducting some visitors through a new exchange, pointed to the cabling and stated: "Please note the millions of little wires going hither and thither, we know not where."

* * *

Carrying their own equipment, linemen, repairmen and telegraph operators of the Signal Corps swarmed ashore with the first waves of troops in the Salerno landing and installed 700 miles of communication wire during the first 10 days of the invasion of Italy.

Soldiers of the Signal Corps, many of them communication workers in civilian life, during the first 18 hours, set up four switchboards just behind the beaches, as well as six telegraph sets and had communication systems operating over a wide area.

Two jeeps carrying equipment were put out of commission early in the fight, one by an enemy mine and the other by battery failure. The telephone crews then merely loaded all the equipment they could carry on their backs and continued to move forward with the assault troops.

In addition to shell fire, snipers and bombs from enemy planes, these Signal Corps crews were faced with many obstacles. Wire from existing lines had to be destroyed and many of the poles had been burned by the Nazis to prevent their use by the 5th Army. Poles left standing were usually rigged with booby traps.

Approximately 200 tons of communications equipment were carried ashore in the first few days of the invasion.

* * *

It usually is interesting to watch people fumble and search for their railroad ticket when the conductor comes through a train making his collections. No doubt most of this is caused by the fact that people put them away so securely that they forget where they have placed them. One answer is to consider tickets as money, which they actually are, and keep them in your wallet until required.

* * *

We received a letter from H. W. Marks of the Humestown (Iowa) Telephone Co. in which he inclosed the accompanying photograph of a sign which has been in service for 10 or 12 years. Mr. Marks states that even the birds like it, but that actually the bird house was mounted on top to keep the water from entering the iron pipe support. This pipe is set in cement and unless the moisture is kept out, it

was found that it soon would rust out at the ground level from the inside.

We are of the opinion that every Independent telephone company should use a sign similar to this one, but that it should have the Independent shield on it instead of the Blue Bell. The sign should also carry a line stating that this is an Independent telephone company. Without a doubt all Independent telephone companies should have signs pointing to their central offices.

* * *

Now we learn of a new cement, claimed to be effective in repairing broken, cracked, or defective metal castings, piping, etc., in making points, seams and loose parts secure, and in stopping leaks in boilers, furnaces, firepots and other metal equipment.

* * *

A friend of mine visited his congressman in his Washington office recently. This chap had a terrific cold and could barely speak above a whisper. The congressman said, "Speak up, don't be afraid, I don't use recorders in my office." One could infer from this that some congressmen do make use of recorders to record the conversations of their visitors. What difference does it make, however, since most citizens write their thoughts to their congressmen and then sign the letter?

* * *

In connection with post-war planning at least one manufacturer is considering a loudspeaker system for use on cross-country busses. The use of a record player for the entertainment of passengers and perhaps a radio set is also contemplated. The driver could cut in on the program at any time to make an announcement such as the next station. It is probable that these busses will also be equipped with a radio telephone.

* * *

One of our readers inquires as to whether a coat of aluminum paint would increase the conductivity of old rusty iron wire. We have never known of this treatment but offhand we would say that it would not. The coat of aluminum would be so thin that probably its resistance would be rather high. Also the job of applying the paint would no doubt prove both difficult and expensive. If the rust were not removed, the paint would probably not last long. Everything considered, we would suggest that the wire be replaced with new as this would no doubt prove to be more economical in the long run.

* * *

A new suitcase-size sound recorder-reproducer makes a record of voice or music extending over an eight-hour period on a continuous strip of specially treated cellophane 320 feet in length.

* * *

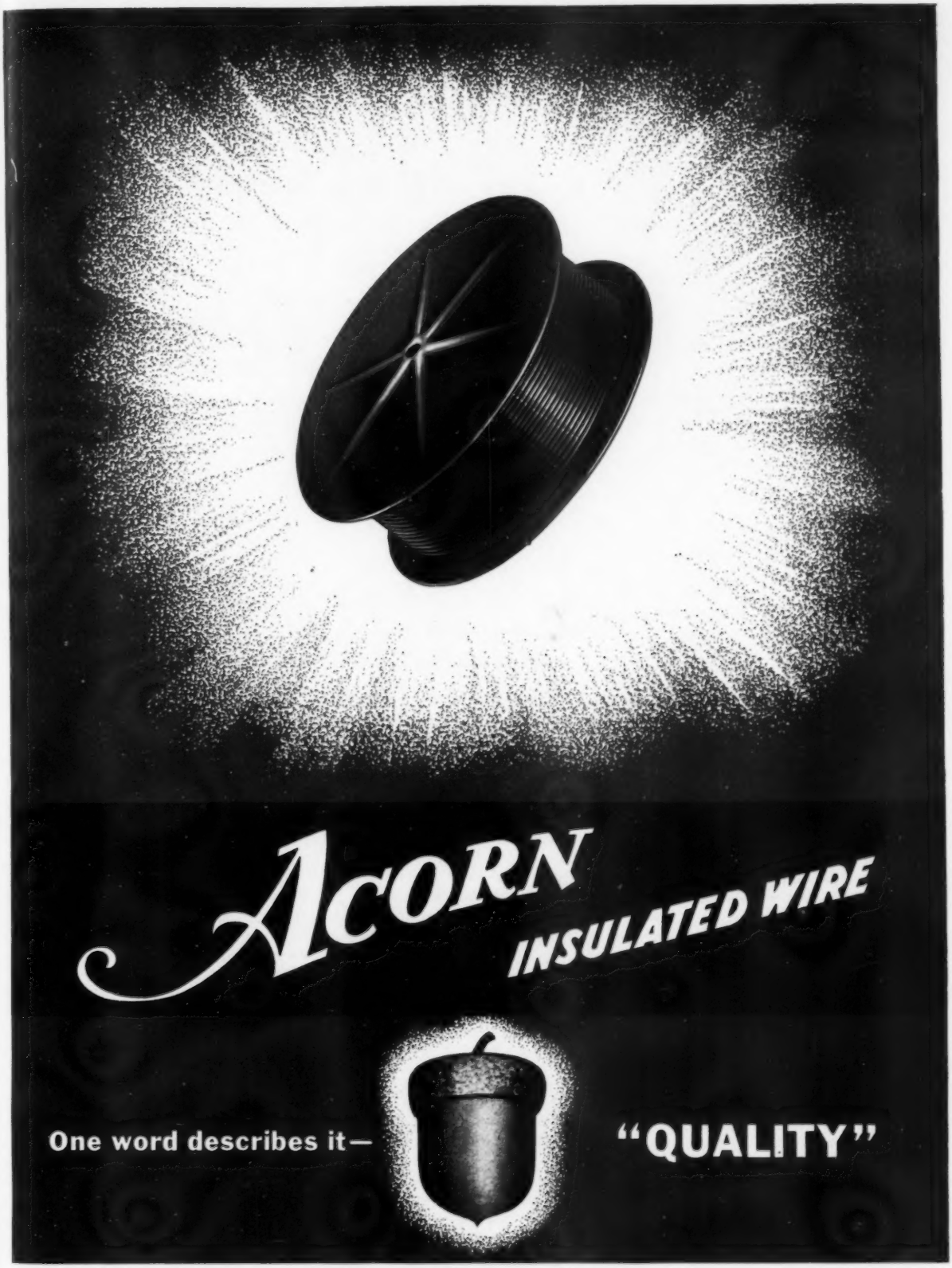
We are not the subjects of our country—we run it. We are not the property of our government—we own it.

* * *

A new fuse for artillery shells is said to be so sensitive that it will explode the shell on hitting a rain drop.

* * *

To its wartime pledge of Production for Victory, American industry adds this peacetime pledge: *To do everything within its power to produce and distribute better goods in greater volume at lower prices to more people, to make opportunity and jobs available for everyone, to help restore and preserve freedom.*



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ACORN INSULATED WIRE CO., INC., 225 King St., Brooklyn 31, N. Y.

Krug, director of WPB utilities division, enters service . . . Edward Falck takes over position. . . . New experiment of joint hearings by Federal Powers Commission and state commissions might have some influence on telephone cases.

WELL, we have a new director of the Office of War Utilities of the War Production Board. He is Edward Falck, former deputy director, who succeeds J. A. Krug. The latter was sworn in last week as an officer of the U. S. Navy. Falck, as in the case of Krug (who was 37) is also of military age, but it is not likely, for various reasons, that he will go into the service in the near future.

Falck is a native of New York City and a graduate engineer of Columbia University. In 1933 he joined the staff of the Tennessee Valley Authority, where he met J. A. Krug, then also on the TVA staff. It was there he established an association with Krug which has continued off and on ever since. In 1937, however, Falck left the TVA to go back to his home town to serve on the staff of the Consolidated Edison Co. of New York City. Three years later in July, 1941, Consolidated Edison loaned Falck to the old Office of Production Management, which was the predecessor of the present WPB. A short while thereafter Falck resigned from the Consolidated Edison Co. and was appointed Krug's deputy when the latter was made director of the Office of War Utilities early last year.

Because of the fact that Falck has been closely identified with Krug's policies and was active in helping formulate many of them, it almost necessarily follows that Krug's departure from OWU does not mean any drastic change. Anyhow, it is probably too late in the day, as far as war power policies are concerned, for any revolutionary elements to make much headway. The controls set up by Krug are pretty well set. Any effort to reverse or violently upset these controls would draw immediate fire from the Army and Navy, which have generally concurred in Krug's policies heretofore.

Krug's departure will, however, probably weaken OWU influence. Krug was respected both within and without WPB. He was well known to be willing and able to stand up and buck strong influences from outside federal agencies. Some of these same agencies which have been heretofore silently critical of OWU may not be so silent from now on. The new director of OWU will no doubt do his best to build his own place and solidify OWU in the future. But at best, there will be a temporary "wobbly" period which will bear close watching—especially in view of the steady drain of veteran OWU talent to the armed forces or back to civilian life. A successor for Krug's job as WPB vice chairman in charge of the Requirements Committee is still very much up in the air.

For reasons already mentioned, this shake-up in the top-flight of OWU will not mean any immediate change in the WPB Communications Division, which is part of OWU. The director of that division will continue to be L. H. Peebles, and his deputy director, Francis T. McNamara, with Eugene H. Merrill head of the telephone branch.

Ever since Krug took control of the Communications Division last year, he has left it pretty much alone because, as he said at the time, the Communications Division was doing a good job. There was no sense in interfering with a winning combination merely for the sake of interference. There is no reason to believe that new Director Falck will follow any different policy.

* * *

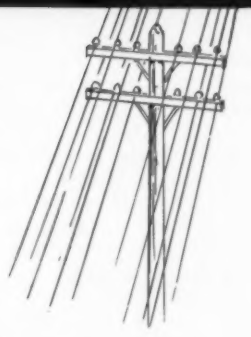
Th subject of radio relay continues in a state of ferment behind the scenes of the communications industry. Several weeks ago the Bell System started the ball rolling with the announcement of its experimental facilities for broadcasting toll traffic between Boston and New York over a series of booster stations instead of using land wire communication as in the past. But the radio broadcasting industry has not by

ALL ALONG THE LINE...

This is York-Hoover Model 4013-WL, a practical combination body unit incorporating capstan or horizontal winch, overhead ladder and ring assembly, ample space for tools and materials in side cabinets, telescoping roof, diamondette steel floor and sturdy understructure.

Yes, all along the line you will see these YORK-HOOVER Bodies turning in one efficient day's work after another. Their performance during these war emergencies has proven their ability " to take it." York-Hoover Public Utility Equipment Engineers designed and built these bodies. Their performance and ability " to take it " have proven that skillful engineering, the right materials and long years of experience are still the best insurance for constant, trouble-free operation.

York-Hoover engineers are planning even better construction of new equipment, light and medium duty units, as well as heavy duty line bodies; so let us help you with your future plans by producing better body equipment for you—*for tomorrow*.



YORK-HOOVER CORPORATION

BODY DIVISION

YORK, PENNSYLVANIA

any means given up the idea of using its own radio relay facilities instead of paying the telephone industry to function as a common carrier for the same.

Last week the General Electric Co., which is in business to sell equipment without discrimination to either the telephone industry or anybody else, disclosed at a press luncheon in New York that it is planning to install a "two-way television relay" network between New York and Schenectady as soon as manpower and materials are available. This will involve four ultra high frequency radio relay stations and permit a complete interchange of programs between Schenectady and New York.

There was also announced the perfection of a new type "disc seal tube" which makes possible a large family of ultra high frequency tubes operating in parts of the radio spectrum which were impractical for use before the war. General Electric's immediate interest appears to be in the development and sale of television equipment, both transmitters and receiving sets. The company's sales manager predicted that television receivers in the postwar period could be produced with excellent performance at prices around $200, based on pre-war price levels.

Of course, none of these developments settles the important regulatory question which the FCC will one day have to settle—whether postwar radio and television industries will be permitted to develop their own radio relay facilities, or whether it will be handed over for operation by the telephone industry on a common carrier basis, just as radio network programs are now carried. This issue, of course, is quite independent of the plans which the Bell System seems to be making for using radio relay circuits to carry toll messages in regular telephone traffic.

One well-known telephone engineer, now serving with the armed forces, recently told this writer that it would not surprise him if, within 15 years after the war, there were no such thing as a long distance telephone toll line in existence, anywhere on continental United States, for message hauls in excess of 50 miles—all of such traffic being handled either through the air or under the ground.

* * *

A regulatory innovation well worth reporting and keeping an eye on is the "dual hearing" technique which has been developed by the Federal Power Commission, but which the Federal Communications Commission has shown indications of adopting in connection with recent joint proceedings on the

Col. Thomas C. Spencer, Signal Officer of the 4th Service Command, Atlanta, Ga., presents a watch to Walter R. Taylor, civilian telephone engineer, on his retirement after 50 years of government service. Colonel Spencer is now on leave and will retire from active service in June of this year. He has the Purple Heart award. The colorful career of Mr. Taylor was described in the Special Signal Corps issue of TELEPHONY, December 11, 1943, in the article, "Engineering History of the Signal Corps."

"surcharge" issue with the District of Columbia Public Utilities Commission.

The "dual hearing" technique has an interesting background and, if anything comes of it, it will be a tribute to the tact and wisdom of Nelson Lee Smith, the most recently appointed member of the FPC.

It was early this year that the FPC found itself pretty much at loggerheads with the Arkansas Department of Public Utilities over some electric rate hearings in Arkansas. These hearings had started out to be a joint enterprise until the state commission found out that an FPC regulation would give the FPC representatives absolute veto power over the scope of the proceedings, evidence which might be introduced, considered, or excluded, and so forth. The Arkansas commission considered this to be tantamount to abdication of its own regulatory sovereignty. It found out, for example, that the FPC was not disposed to consider any evidence or reproduction cost or any other valuation evidence except strict original cost evidence. The state commission, on the other hand, seemed disposed at least to consider such evidence, without necessarily following it.

The clash resulted in a break-up of the "joint" proceedings and, at one time, the Arkansas board actually subpoenaed a couple of FPC officials as witnesses. It took a good deal of compromising and patching up to prevent an ugly controversy between the state and federal boards. This was finally done with both commissions going their own way but agreeing to make an exchange of certain testimony available.

FPC Commissioner Smith saw the danger of such conflict and sensed that it might well spread to other states if something were not done about it. Then, he asked himself this question: Why in the world could not representatives of both a state and federal commission hold joint but *mutually exclusive* hearings for the sake of economy of time, expense, and regulatory effort in general? This, without either state or federal body sacrificing its own ideas as to what kind of evidence it wanted to consider, and so forth.

Commissioner Smith saw that it would be necessary for the two commissions' representatives to get together and determine what issues were in common agreement and to narrow down the issues upon which there might be a difference of approach or regulatory policy. This much being accomplished "by stipulation," as the lawyers say, or a sort of "pre-hearing" rehearsal of the regulatory program, the two boards could then cover perhaps four-fifths of the testimony in perfect harmony, and each commission could thereafter make its own record with respect to the remaining area of dispute.

A handy guinea pig happened to be lying around in the form of a pending investigation into the rates of the Montana Power Co. Both the FPC and Montana Public Service Commission wanted to go into this company's affairs, so the Montana commission agreed to stipulate a program in accord with FPC.

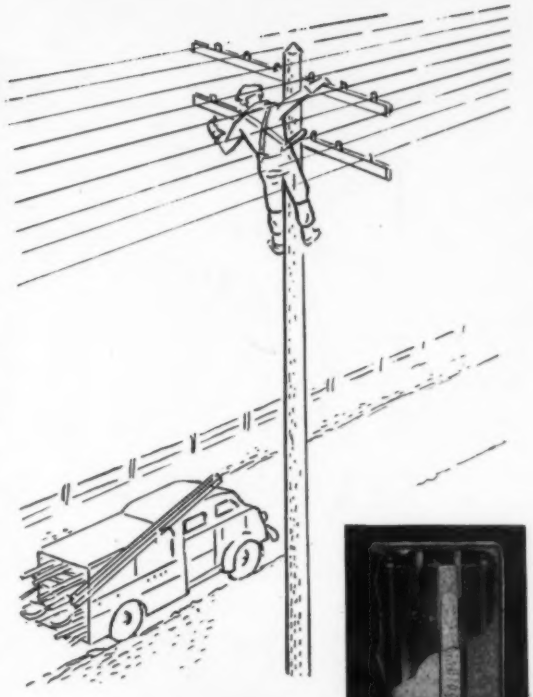
As a result, hearings have been going on for the past fortnight in Butte, Mont., in which the same witnesses have been listened to by Trial Examiner Edward B. Marsh of the FPC and Chairman Austin P. Middleton for the Montana Public Service Commission. Incidentally, the principal witness to date for the power company turned out to be John H. Bickley, who, many readers of this department may recall, was once chief accountant in charge of the special Bell investigation of the telephone industry by the Federal Communications Commission back in 1936.

The hearings have not been entirely harmonious and there have been clashes between company and commission counsel. But it is a novelty to see the federal commission *sustain* an attorney's objection on a particular point while the state commissioner *overrules* the same objection — each board thereafter going along, making its own record, for a litle bit, and

(Please turn to page 42)

PLAN NOW
for future service

Service has a new meaning. The service we know today and will know in the future is unlike pre-war standards. Service in the future will demand equipment with a science in both design and construction. That is the secret of Reliable equipment acceptance and specification in postwar plans. This equipment has been kept in tune with the times. It fully meets the demands of telephone service with an individualized standard of long efficient and trouble-free operation; convenience of installation and maintenance; and last, but not least, performance that is true economy in every respect. The "Reliable" Line includes a wide variety of telephone equipment, other than illustrated here, all of which is described in detail in the Reliable Telephone Specialties Catalog. If you do not have a copy—write for it.



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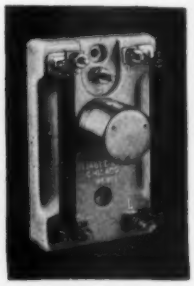
No. 1000 Outdoor Protector with fuses and air gaps for protection against static and crosses with electric circuits. Weatherproof cover.

"R.U." reversible unprotected Cable Terminal provides exceptional convenience in installation and long dependable service.

"Reliable" B-27 Cable Terminal. Available in three types, for three standard cable terminal fuses. Equipped with detachable mounting bracket, which permits one-man installation. Binding posts are at front conveniently accessible to the lineman without removing fuses or reaching around the terminal. "Reliable" Self-cleaning Sawtooth Discharge Blocks are standard and are held in position by individual springs. Terminal mounts solidly and close to pole—no tilting.

"R.U.G."—reversible unprotected, gas tight cable terminal for underground installation. This unit incorporates the same time-proved features and dependability as the "R.U."

No. 402RR—dry spot lightning arrester for crossarm and other outdoor mounting. Equipped with "Reliable" self-cleaning Sawtooth Discharge Blocks.



No. 955 One-piece, substation protector, with low absorption porcelain base. Eliminates use for asbestos mats.

"Reliable" P Drop Wire Clamp. For attaching No. 17 B. & S. twisted pair or parallel drop wire to poles or buildings. It prolongs the life of the drop wire, permits free swinging at the tie, places all wear on the hardware and eliminates sharp bends necessary with other methods.

Zinc Cable Hangers for supporting lead covered cable and insulated conductors to steel strand. Copper hangers available on request.

OVER 35 YEARS SERVICE TO THE UTILITIES

Keep 'em Talking!

WITH THESE BETTER TELEPHONE SUPPLIES....

Long life i
poles. B
trouble-

When cables need extra protection, we suggest alligator Cable Wrapping Cloth, Ruberoid Asphalt Paint, Drierite Desiccant and similar trustworthy products.

Save material and save time — preserve existing line and drop wires with Nicopress Splicing Tools and Sleeves. They produce splices stronger than the wire itself.

The West Test Set is a "one-
trouble gang. Saves time—
money—and keeps lines in
operating condition.

These glass insulators have proved under test to be stronger than their supporting pins. We handle and recommend both Whitall Tatum and Hemingray.

you order "Black Beauty" or Taylor-Colquitt
ed by modern methods to provide rot-free,

Long life
poles. B
trouble-f

Your linemen will appreciate the extra safety of Klein Safety Belts, Straps and Climbers. They are noted for their strength and dependability.

Trees don't stop growing during war-time. Keep them trimmed away from your lines with Newman Tree Trimmers and Pruners, designed for fast, clean action with minimum effort.

An Estwing Hammer can pull the head of a spike through a 2-inch plank, due to its one-piece tool steel construction. We also recommend Klein Pliers and Yankee Screwdrivers.

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ORIGINATORS AND DEVELOPERS OF STROWGER STEP-BY-STEP MACHINE SWITCHING AUTOMATIC DIAL SYSTEMS

MAKERS OF TELEPHONE, SIGNALING AND COMMUNICATION APPARATUS
ELECTRICAL ENGINEERS, DESIGNERS AND CONSULTANTS

Distributors in U. S. and Possessions:
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then coming together on the same track to the next witness.

As in the case of the Arkansas commission, the principal difference between the Montana board and the FPC seems to be on listening to testimony with respect to "fair value." The FPC refused to hear any part of it. The Montana board is disposed to listen to it for what it is worth.

* * *

More signs that regulatory commissions may be in an experimental mood could be found in recent electric rate hearings before the District of Columbia Public Utilities Commission. William V. Bernell, witness for Potomac Electric Power Co. introduced rate base evidence which he called "trended original cost." By this method it was proposed not only to avoid the extreme and unrealistic possibilities of the purely hypothetical "reproduction cost" theory of rate valuation, but also to avoid the unfair restriction of a rigid application of the original cost theory along the lines of the so-called "prudent investment" doctrine.

Mr. Bernell explained his "trended original cost" technique as follows:

"We have undertaken to make adjustments . . . to bring the total original cost into harmony with prices and costs of construction prevailing in the year 1942; in other words, to determine what the cost of this property would have been if the level of prices and costs at the time of original construction or installation had been the same as it was in 1942."

Mr. Bernell said he used the "trended original cost" method rather than making reproduction cost estimates because he felt that the latter estimates could not be obtained at the present time nor within a reasonable period. He said, however, that the two methods reached about the same results.

Throughout the hearings, federal agencies, intervening in the case, have contended that the rate base should be fixed on the basis of the original cost of its plant and equipment. The company has been equally insistent that the district utility statute requires an estimate of fair value in reaching a figure for the rate base and that reproduction costs must be considered.

This technique is not really new at all. The Maryland Public Service Commission used it, in substance, on the Chesapeake & Potomac Telephone Co. several years ago — by applying commodity price indices to original cost of plant items in order to bring them up to date and in line with prevailing costs of such items. The Supreme Court in that case, however, overruled the commission because the exact commodity price indices used were too general and were not clearly enough related to actual plant items used in telephone company construction. That was before the Hope case was decided. If the Maryland commission did the same thing today, its method might well stand. Anyhow, "trended original cost" is a generally handy short-cut, well worth looking into to avoid the extreme rigors of the "prudent investment" method.

FAMILIAR FOLKS

". . SHE HAD A LOVELY VOICE"
"You had a call when you were out," says Sue,
"I think she had a lovely voice! I do!"
And this is Susie's only right to fame:
She always adds, "I didn't get the name!"
"MIGHT AS WELL BE IN CODE"
Another office type that is terrific—
The man whose writing's always hieroglyphic.
It takes more time to figure out his note
Than it took him altogether when he wrote.
"THEN HE.. HA..HA..SLIPPED ON A BANANA PEEL AND FELL INTO A MANHOLE"
"I'M GLAD HE ENJOYED IT. HE SPOILED IT FOR ME"
We don't object to people seeing shows,
But one we'd do without is—Heaven knows!—
The man or girl who sees a movie Sunday
And tells you each detail of it on Monday.
"ASH DAY, AGAIN"
A most unwelcome chap is Smokestack Joe.
His cigarette is always on the go.
From desk to desk within a cloud he dashes,
Leaving each a souvenir of ashes.
"SHE THINKS IT'S HER PRIVATE LINE!"
BLAH BLAH
The girl we could dispense with most of all
Is she who in the rest room makes a call
And of her conversation never wearies—
Or turns one call into a lengthy series.
"I CAN'T FIND ANYTHING IN HERE!"
"AFTER HE'S MESSED UP MY FILES, HE'LL FIND THE LETTER IN HIS DESK"
And then, of course, there is forgetful Stella
Who's sure to go to lunch with your umbrella;
And also Joe who always wrecks the file
To find a letter he had all the while.
Verses by Walter M. Balgust

(Courtesy, The Telephone News)

Storm Impairs Telephone Service at Durham, N. C.

A heavy downpour, accompanied by high winds, put more than 300 telephones out of commission at Durham, N. C., the night of April 11.

R. E. Kepler, general superintendent of the Durham Telephone Co., said that the storm caused cable trouble which left telephones out of order in many sections of the city. Maintenance crews worked throughout the night and did not get all of the telephones back into use until April 13.

Two Arkansas Exchanges Get New Supervisors

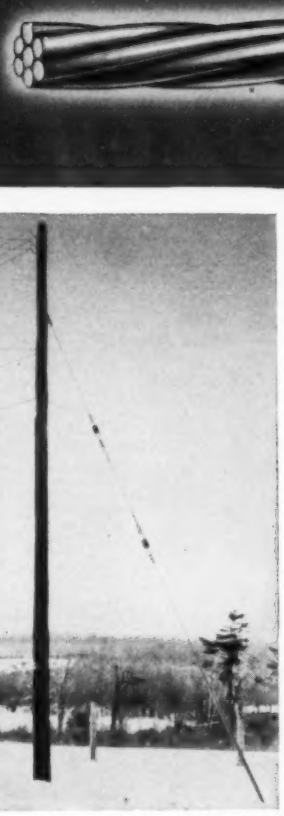
Mrs. Jeff Medlock, who was in charge of the Cotton Plant (Ark.) exchange of the Mid-West States Telephone Co., has recently taken over the McCrory (Ark.) exchange.

Mrs. Mary Thames of Jacksonville, assisted by Mrs. Betty Parker of Augusta, is succeeding Mrs. Medlock at Cotton Plant.

AMERSTRAND

The Preferred Strand

For Guys, Messengers and Ground Wire



Its great strength and long life insure unfailing efficiency — and economy

To withstand extreme unbalanced tension in distribution and communication lines — to furnish protection against lightning for transmission lines — to carry the weight of cable over long spans—you need a strong, durable steel strand that can be installed and maintained —economically.

Amerstrand Steel Strand's high tensile strength comes from controlled quality steel. Its uniformity comes from the most modern processing methods—rigid adherence to specifications. Its long life in service comes from the zinc coating applied by a special process which furnishes the utmost protection against corrosion.

Complete engineering data, everything the construction, operating and maintenance man needs to know, is available in our convenient handbook of 98 fully illustrated pages. Send for your FREE copy.

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They are your assurance of highest quality

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United States Steel Export Company, New York

UNITED STATES STEEL

SMALL EXCHANGE CIRCUIT ANALYSIS

By Harry E. Chapman

Chief Dial Switchman, Intra-State Telephone Co., Galesburg, Ill.

STROMBERG-CARLSON circuit B-19990 will be discussed in this chapter. This is a lamp signal magneto line circuit which is designed for either local or rural line service. This circuit is shown complete in *Fig. 1.* That part of the circuit, which functions during the signaling of the operator by the subscriber with a hand generator, is shown in *Fig. 2.* Each line jack is equipped with an inside set of break contacts. When a plug is placed in a line jack the inner tip and ring contacts will be opened, which disconnects the winding of the line relay from the line. The tip is connected directly to the 670-ohm winding of the No. 1 line relay. The other side of this winding is connected to the ring side of the line. With "X" wiring the 670-ohm winding of the line relay is connected across the tip and ring and for "Y" wiring this winding is connected from the tip side, through the relay winding to ground.

The operation of this circuit will be explained by referring to *Fig. 3.* The operation of the hand generator in the subscriber's telephone causes alternating current to flow over the line, through the 670-ohm winding of the line relay causing it to operate. The operation of this relay closes its No. 1 contact with contacts 2 and 3. The No. 1 spring is connected to battery through the release feature which will be described in detail later. This battery then flows through contacts 2 and 3 of relay No. 2 and the 250-ohm winding of the No. 1 or line relay to ground. This feature tends to stabilize the line relay and prevent it from chattering.

Another circuit arrangement is indicated in *Fig. 4* which operates the No. 2 relay to light the line lamp. This circuit may be traced from battery through the release relay, then contacts 1 and 2 of relay No. 1 and the 500-ohm winding of No. 2 relay and the A contact on the line jack to ground, through the winding of the pilot relay. This

PART VI. The fifth article in this series was published in the March 25 issue, page 16.

operates relay No. 2, its 1 and 3 contacts make and 2 breaks, which removes battery from winding of the line relay permitting it to restore to normal at the end of the ringing period. The No. 1 contact of the No. 2 relay places battery from the release on the No. 2 relay winding, holding it in an operated condition as indicated in *Fig. 5.* The 500-ohm lamp relay has a 500-ohm, non-inductive winding connected directly across its winding, as shown in dotted lines in *Fig. 4,* to prevent sparking as the contacts open. The principle of this

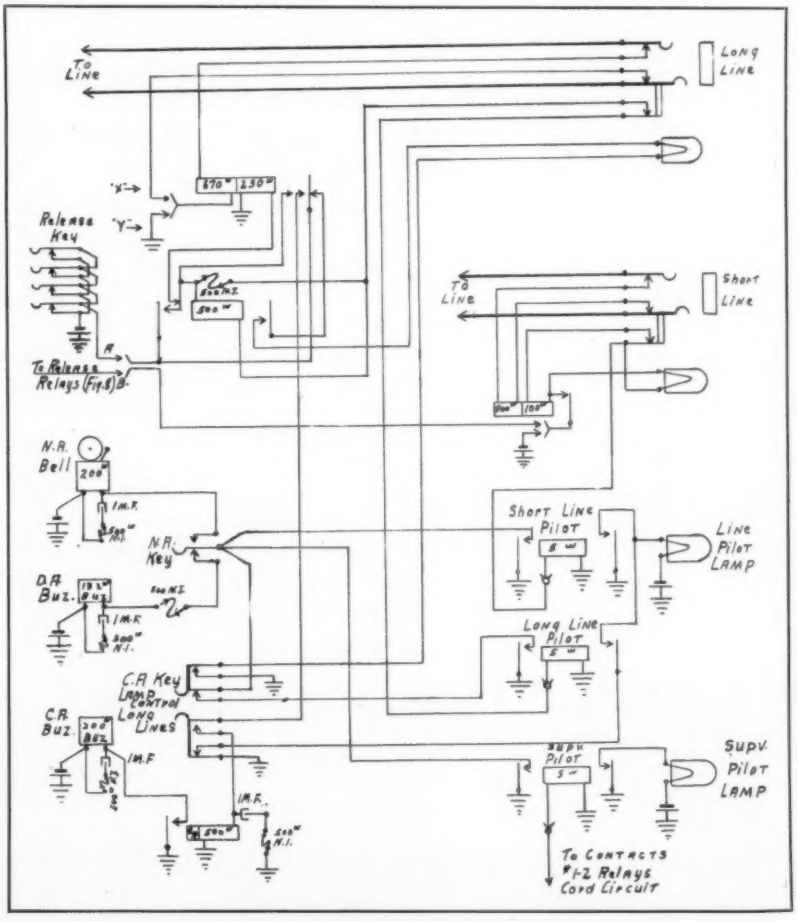
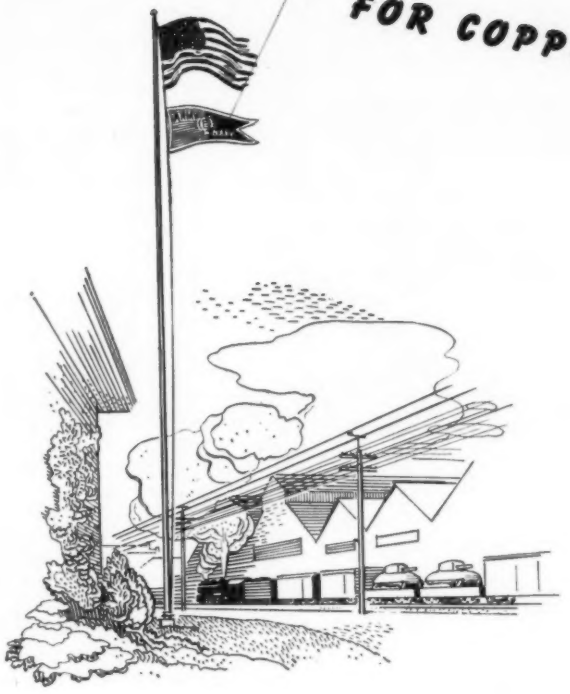


FIG. 1 (Other illustrations on pages 46 and 48).

A STAR ★ FOR COPPERWELD'S "E" FLAG



In recognition of their production record for the Signal Corps during the past six months, the men and women of the Copperweld Steel Company were presented with a Second Production Award in February. This Award gives them the right to fly the Army-Navy "E" flag with one white star. Copperweld's production capacity has been drafted by the Army for the duration of the war, just as many millions of men have been drafted.

Copperweld Steel Company • **GLASSPORT, PA.**

Copperweld TELEPHONE LINE WIRE

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PERMANENCE
CONDUCTIVITY

FOR VOICE AND CARRIER CIRCUITS ON OPEN WIRE CONSTRUCTION

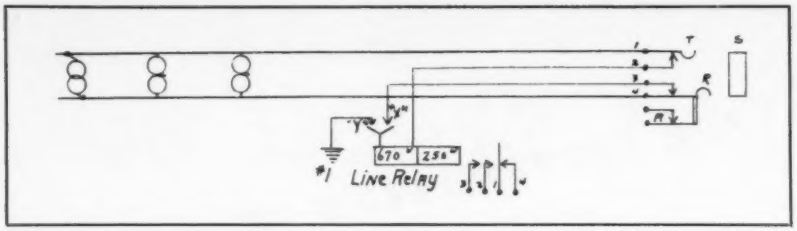

FIG. 2

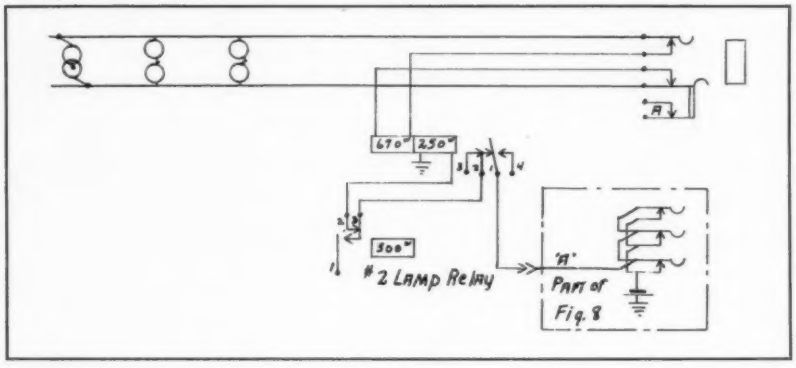

FIG. 3

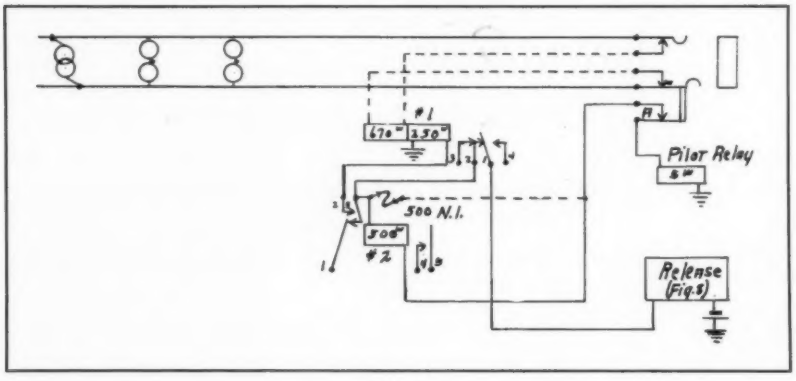

FIG. 4

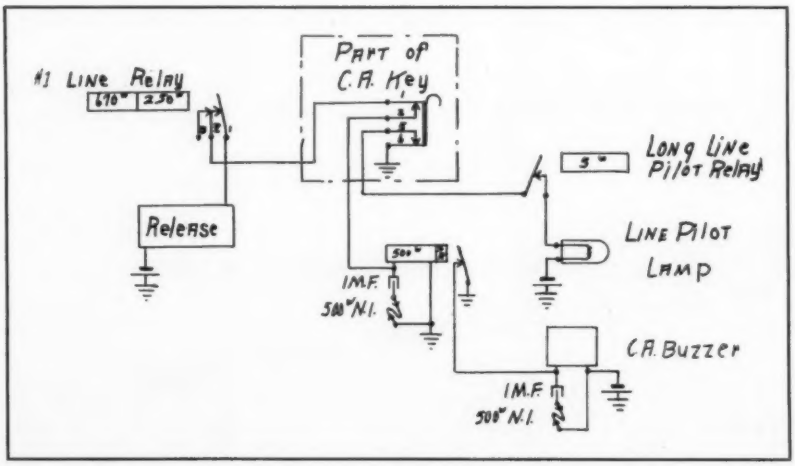

FIG. 4a

feature will be discussed in more detail later.

Again referring to *Fig. 5*, it will be noted that the No. 1 lever spring of the lamp or No. 2 relay is connected to the No. 1 spring of the No. 1 relay and both in turn to battery through the release relay. When the No. 1 spring of the No. 2 relay makes contact with the number 3 spring, the No. 2 spring is opened, which removes battery from the winding of the line relay, permitting it to release. However, due to the fact that the No. 1 spring makes contact with the No. 3 spring before No. 2 spring is opened, lamp relay No. 2 is held in an operated position. When this relay operates it closes its No. 4 and 5 springs which connects battery to the lamp through the release.

This circuit may be traced from battery, through the release relay, then 1 and 4 springs of No. 1 relay, which is now in a normal position, through No. 4 and 5 springs of No. 2 relays, the lamp, the contacts of the code alarm key *(Fig. 9)* to ground. This operation will light the line lamp, subject to the operation of the line relay and the operation of the line pilot relay will, in turn, light the pilot lamp associated with this group of lines.

The line lamp associated with the line under discussion will not light as long as the hand generator is being operated due to the fact that the No. 1 contact of the No. 1 relay does not make with its No. 4 contact *(Fig. 5)* to feed battery to the lamp through contacts 4 and 5 of the lamp relay until it restores. The lamp relay has already operated and remains in this position until released by the insertion of a plug in the jack which opens A contact. Should the subscriber be ringing another party on the same line, by means of a number of long and short rings, the lamp will be extinguished each time the line relay operates in response to the operation of the hand generator. This is known as "negative ringing" and indicates to the operator that a code signal is being used to signal someone on the line and that the operator is not required.

When No. 1 relay is operated *(Fig. 4a)* battery from the release is used to operate the code alarm buzzer and provide an audible signal to the operator. The code alarm buzzer will follow the operation of the No. 1 relay, as when a subscriber rings on the line with a system of codes. This will not only cause the line lamp to flash in response to the ringing, but if desired, an audible tone may also be provided. With this feature it is not necessary for the operator to remain at the switchboard at all times in very small exchanges.

When the operator plugs into the

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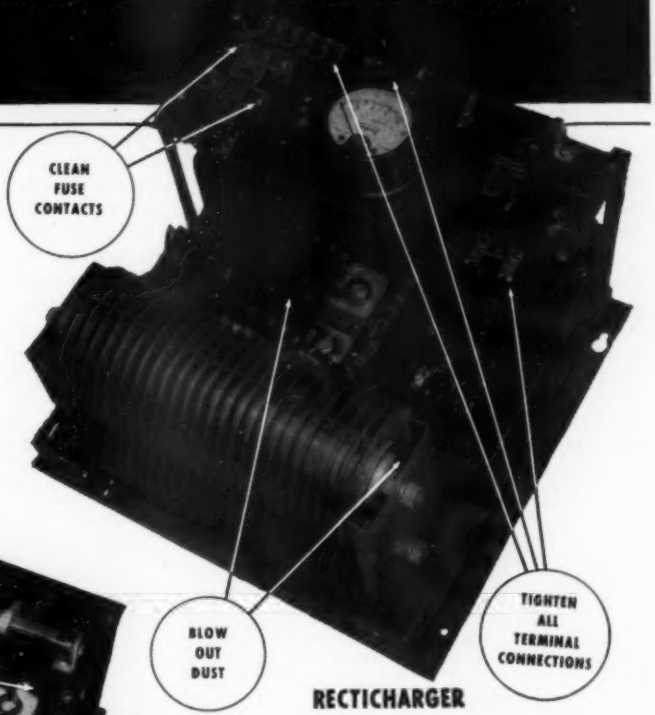
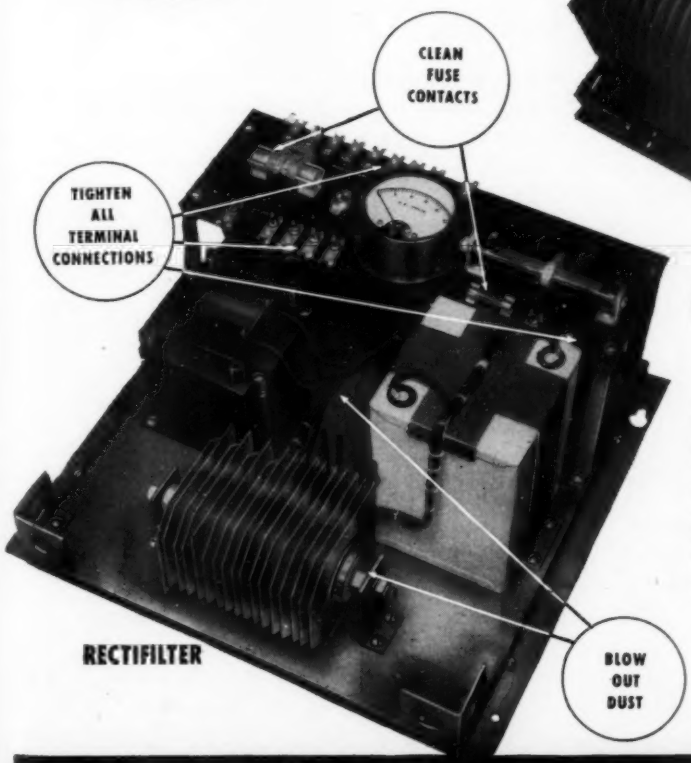


RECTICHARGER



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RAYTHEON MANUFACTURING Company

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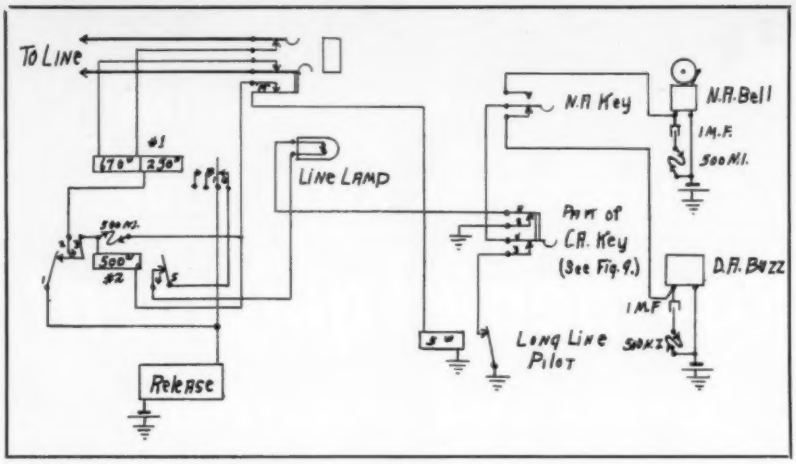

FIG. 5

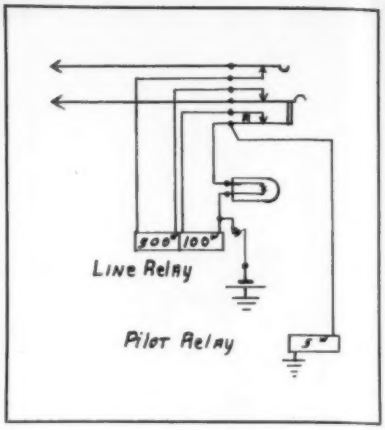

FIG. 6

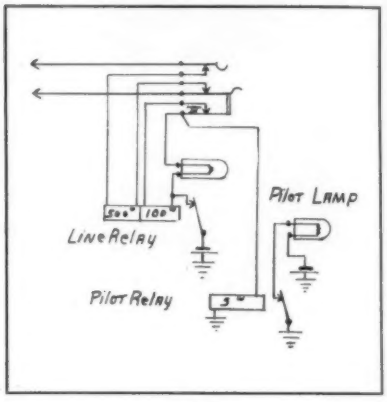

FIG. 7

line jack, spring A opens the circuit between the line pilot and the lamp relay springs *(Fig. 5)*. This causes the lamp relay to restore to normal, which opens the circuit to the line lamp. The line pilot will also restore and extinguish the line pilot lamp.

The simplified local or private line circuit is shown in *Fig. 6*. This circuit uses only one tandem wound relay. One winding of 500 ohms is connected to the break springs of the line jack. This winding is energized by the operation of the hand generator at the subscriber's telephone. When the line relay operates, it closes the make contact, which has battery on the lever and is connected through this contact to the 100-ohm winding, the A contact of the line jack and the five-ohm winding of the pilot relay to ground *(Fig. 7)*. The pilot relay controls the pilot light in the conventional manner. When the operator plugs into the jack the A contact is opened, which releases the line relay and extinguishes the lamps.

In the explanations of this circuit, frequent reference has been made to release equipment which is a comparatively new feature of this type of circuit and has proved highly desirable

(Please turn to page 66)

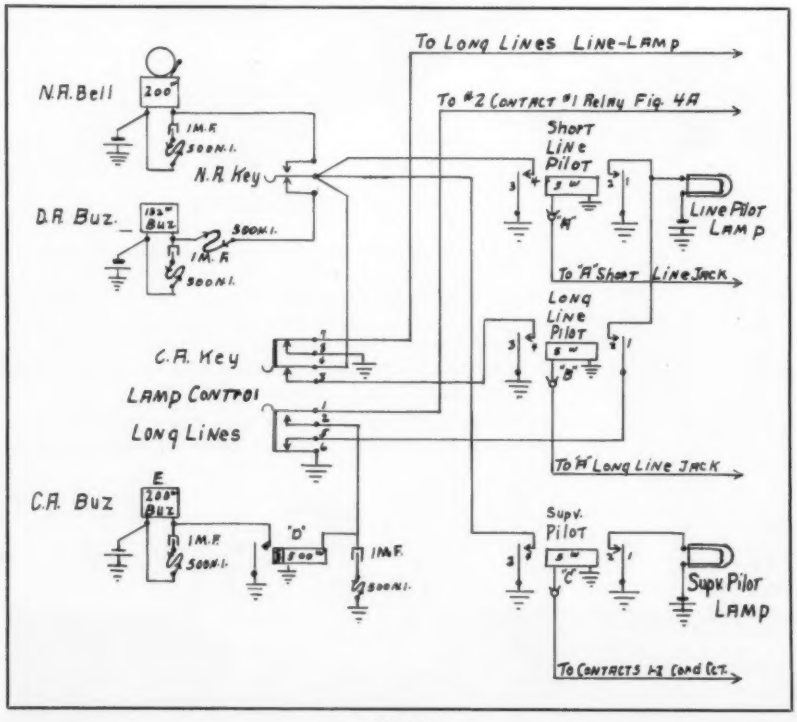

FIG. 9

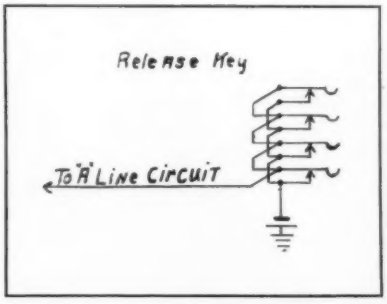

FIG 8a

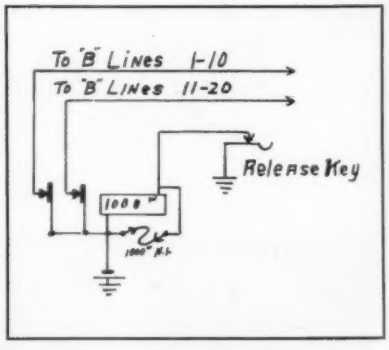

FIG. 8b

Make Your Older Gray Pay Stations as Profitable as These . . . . .

Have you some Gray Pay Stations not in active and profitable use that have been damaged by fires or floods or vandalism? Have you in past years built up complete Gray Pay Stations from damaged ones, leaving in your stock room some incomplete equipment?

Now, when pay stations are so highly profitable you should be getting revenue from every piece of telephone pay station equipment you have. Unless the station has received the worst kind of sledge-hammer treatment, it can be repaired for far less than the cost of a new one.

Write us how many pay stations you have in need of repair and the priority rating you have. We'll let you know about how long it will take to recondition them. Usually we can do it fairly promptly.

Surely it makes sense to have the original manufacturer repair, rebuild, recondition or convert such equipment. Why not pass the word on now to find out how many Gray Pay Stations you have which are not out making money for you?

Have you an idea or invention in Electro-Mechanics . . . . . ?

. . . Which you think will aid the war effort, or has a peacetime application? We'll be glad to develop it with you on a mutually satisfactory basis.

We plan to add five or six products for postwar. If you have an idea or product which you think will round out our activities, write Mr. W. E. Ditmars, President, in detail. We will consider any practical arrangement to work with you.

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Tennessee independent telephone men and women attend the annual luncheon at the recent convention of the Tennessee association.

TENNESSEE INDEPENDENTS

Hold One-Day Meeting

THE EIGHTH annual convention of the Tennessee Independent Telephone Association, held April 7 in Nashville, attracted a record attendance of Tennessee telephone men and women who gathered to discuss the many wartime and customary industry problems in that state. Because of gasoline and tire shortages and other transportation restrictions, this year's meeting was held to a one-day duration.

The following were elected directors for the ensuing year: J. N. Cox, Cookeville; S. B. Dibble, Jr., Cookeville; J. L. Dickens, Unionville; C. D. Dickey, Adamsville; B. L. Howard, Millington; Kelley McNish, Bristol; A. E. Reynolds, Bristol; J. W. Vaughn, Waynesboro; and J. W. Wray, Tracy City.

The directors elected the following officers: President, Mr. Dibble; vice presidents, Mr. Vaughn, Mr. Dickens, and Mr. McNish, and secretary-treasurer, Mr. Wray.

In his annual address, President Reynolds gave a complete resume of the activities of the association during the past year and commended telephone companies in Tennessee for their performance in meeting their many responsibilities brought on by the war, urging them to maintain their efficient operations.

He also paid tribute to the United States Independent Telephone Association for its efforts to protect the industry and for its interest in the smaller companies and their problems.

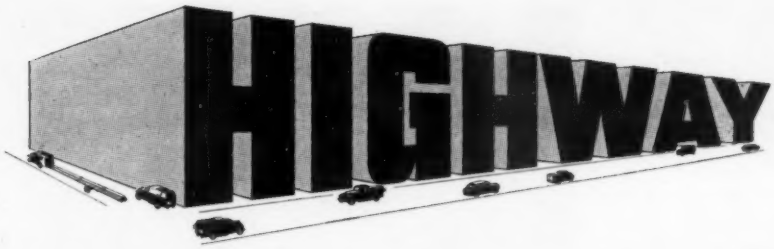
Secretary-Treasurer C. S. Stanton, Cookeville, reported the status of the membership and finances of the association, which showed the organization to be in a sound position from both standpoints.

B. C. BURDEN, Washington, D. C., engineer, United States Independent Telephone Association, addressing the Tennessee association at its annual meeting.

W. E. Duncan, Atlanta, Ga., Tennessee manager of the Southern Bell Telephone & Telegraph Co., spoke on "The Coming Need for Even Better Public Relations." He recited the good quality of public relations of the industry in the past and at the present time, but he stated that telephone companies must put forth greater effort to build better public relations in the period after the war when they will have difficulty in meeting the stored-up demand for service. He paid tribute to the spirit of telephone employes and gave them credit for maintaining the high degree of public relations of the telephone industry.

R. C. Reno, TELEPHONY's editor, was to have addressed the meeting on "The Small Telephone Company," but he was unable to attend. His address, which was read by Mr. Dibble, was published in the February 19 issue of TELEPHONY.

R. A. Maybury, Glasgow, Ky., Kentucky superintendent of the Southern Continental Telephone Co., presided over the commercial conference. Mr. Maybury emphasized the many problems which confront the commercial offices today. Interesting skits in which Mrs. Minnie Asply, Glasgow, and Orville Esters, Cave City, Ky., took part,



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1. **Highway Line Construction Bodies are beautifully balanced, assuring proper weight distribution and efficiently designed to utilize every inch of space to carry the various tools and materials used by line crews.**

2. **Highway General Utility Bodies are available in three types, carefully designed for installation and general service work.**

3. **Highway Cable Reel Trailers provide a quick and effective means of loading and transporting heavy and unwieldy reels of cable.**

4. **Highway Pole Trailers — designed especially for public utility service—carry the entire load of poles on the trailer, eliminating the necessity of a special truck with bolster on bed of truck.**

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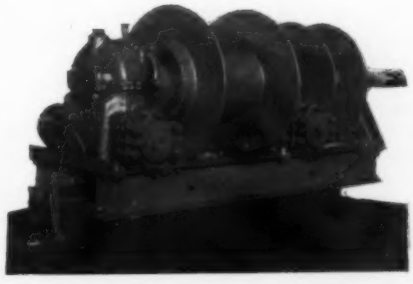
6. **Highway Earth Boring Machines speed up line construction and maintenance by digging the hole in almost any soil condition and in less than two minutes' time.**



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GENERAL OFFICES

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portrayed the proper handling of subscribers who had been (1) cut off because of non-payment; (2) left out of the directory, and (3) having interference on party-lines. A skit also portrayed the proper method of contacting and working with switch line secretaries.

John E. Sexton, Bristol, auditor for the Inter-Mountain Telephone Co., spoke on "Taxes." He criticized the complicated federal tax schedules and forms and suggested that steps be taken to simplify the tax situation. He stated that current efforts to modify and simplify taxes are a good illustration of futile tinkering and recommended that a non-partisan technical commission be established to bring about such modification.

Mr. Sexton said it is about time that tax payers and campaign contributors have a show-down with their senators and representatives on the present methods of taxation. He rapped the government's effort to drain off practically all telephone companies' revenues through excess profits taxes and said such action will mean that the companies will be compelled to borrow money in order to carry out the deferred maintenance and new plant construction which will be necessary to put plants in sound condition after the war. He stated that the companies should be allowed to put in a reserve a portion of the funds now being turned over to the government to be used in the postwar reconstruction period.

Mr. Sexton also criticized the government's implication that telephone service is a luxury by increasing the federal excise taxes on that service. He said that telephone service is more of a necessity today than ever before because of transportation limitations and manpower shortages.

Mr. Sexton, in addition, paid tribute to the trade journals for keeping the industry adequately informed of changes in the federal tax procedure.

"A Blueprint for Tomorrow" was the topic of an interesting address by B. C. Burden, Washington, D. C., engineer, United States Independent Telephone Association. Mr. Burden discussed what he believes will be adopted as new methods and procedures in the telephone business after the war, touching upon new ideas involving all departments of the telephone business. His address was very well received and will be published in a forthcoming issue of TELEPHONY.

W. T. Knight, Southern Bell Telephone & Telegraph Co., discussed "Traffic Problems Under Wartime Conditions." He stated that, in order to maintain a standard of service as near as possible to what subscribers received before the war, it has required the ingenuity, skill, and the best thoughts of the entire traffic organizations throughout the country. He told some of the methods the Southern Bell company has adopted to make greater use of present facilities, which have added materially in speeding up service.

(Official U. S. Marine Corps Photo)

MAIRZY DOATS—If MARINE CPL. LOUIS M. BEVERIDGE, JR., New Kensington, Pa., ever gets his wires crossed, a certain Marine division in the Southwest Pacific will make with the double talk. Corporal Beveridge is setting up a telephone switchboard on the side of a tree on an island within range of the Japs.

"Postwar Planning" was the subject of an address by Dr. Philip Davidson, Nashville, Vanderbilt University, and chairman of the Postwar Planning Committee of the Nashville Chamber of Commerce. He revealed interesting facts his committee has found regarding postwar developments.

No Priorities

In the telephone business there are no priorities on kind words or a spirit of helpfulness—PAUL J. JONES, *Assistant District Traffic Superintendent, Bell Telephone Co. of Pennsylvania, Harrisburg.*

Stanley White, auditor of the Tennessee Railroad & Public Utilities Commission addressed the convention on "The Commission's Relation to Independent Companies." Mr. White stressed the fact that there should be closer relationship between telephone companies and the commission and he invited representatives of the companies to come to the commission's offices to discuss with the commission and its staff any problems confronting the companies.

J. W. Wray, manager of the Dixie Telephone Co., gave an interesting talk on "Plant Problems of Small Dial Conversion." He discussed many ways in which auxiliary services could be rendered to the public in the small dial exchanges, such as fire alarm and time of day services. He also discussed a procedure by which blind subscribers in dial exchanges can secure connections with called parties through the operator.

Following Mr. Wray's address, the convention adjourned.

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with which you can quickly and accurately determine the correct tax *on any amount*. This is a small compact Acme Visible Card Index Book, easel type containing both the 15% and 25% tax tables.

No figuring to be done, no machine calculations to be made. All you have to do is flip the card and read the answer.

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Now is a good time to cut out noisy, high-resistance joints, and replace with Nicopress Repair Sleeves. These long sleeves (7 to 10 inches long) span the length of the cut-out splice—make it unnecessary to splice in a new section of wire. Thus, you do the job in one operation instead of two —save wire, save time, save trouble.

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Desiccant
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Keep jar sealed until ready for use.
Keep cover tight between applications or discard remainder.
Discard partially used jar at end of the day.
See Handbook for amount of DESICCANT to be used.
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The Nation's outstanding telephone companies and the U. S. Signal Corps employ the desiccant-drying method. It is easier, faster, safer . . . more satisfactory in practically every way—than outmoded and dangerous "boiling-out."

Prominent among the materials used by these two war-vital services, you'll find Davison's Protek-Sorb Desiccant. Over a period of years, Davison's Protek-Sorb Desiccant has proved, in actual field service, that its maximum capacity for moisture, its scientifically-processed small mesh size, are important factors in results obtained.

Splices dry faster, normal insulation resistance is restored quicker. Insulation and metals are not affected because Davison's Protek-Sorb is chemically inert and non-reactive.

See your regular telephone jobber. He stocks Davison's Protek-Sorb Desiccant in convenient containers that hold pre-determined amounts for most economical use.

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FRONT DOOR PLEASE CLOSE IT ON YOUR WAY OUT!

(Courtesy, Wisconsin Telephone News)

"We're 100 per cent efficient since John made the signs!"

Legislature Gets Bill on Puerto Rico Sale

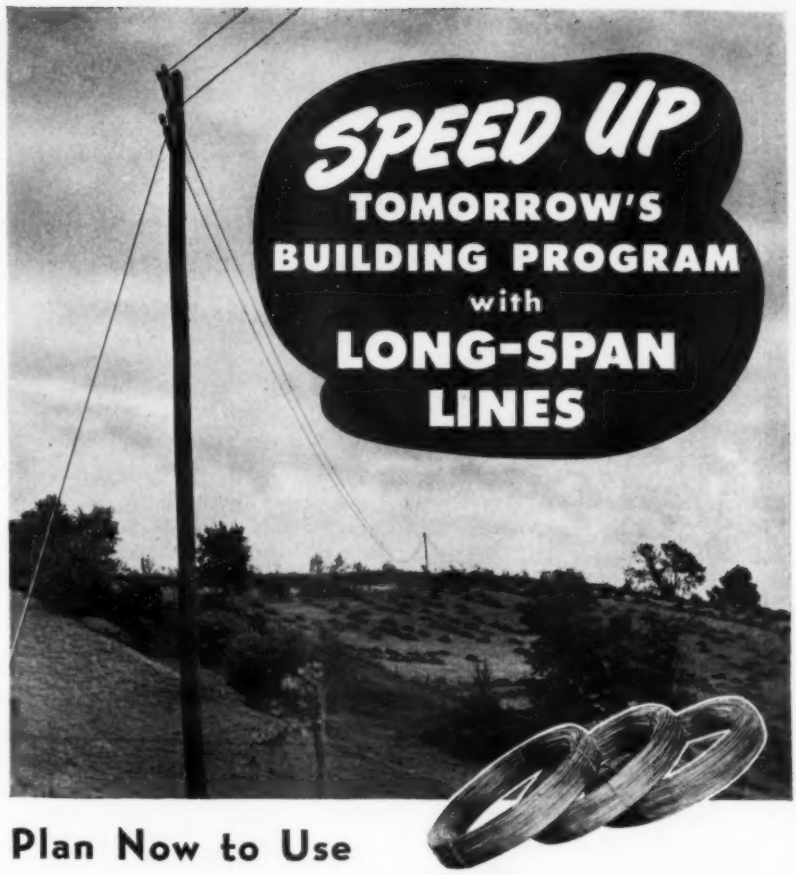
(Special to TELEPHONY)—A Board of Appraisal composed of Cyrus G. Hill of J. G. Wray & Co., Chicago, representing the government of Puerto Rico; Harry V. Wenger, representing the Puerto Rico Telephone Co., and John W. Wopat, Fort Wayne, Ind., representing the Communications Authority, rendered a report to the president of the board of directors of the Communications Authority, fixing the purchase price of the properties of the telephone company at $6,945,008.58 (TELEPHONY, September 25, 1943, p. 20; October 16, 1943, p. 22; January 1, p. 16; February 19, p. 41; March 11, p. 41).

A bill has been introduced in the legislature of Puerto Rico (Senate Bill No. 150) to convalidate the purchase of the properties of the Puerto Rico Telephone Co. by the government. It is an administration bill and it was expected that it would have passed both houses of the legislature before April 15, when the legislature was to have adjourned sine die. However, if the bill is not passed by the legislature the people of Puerto Rico will have to wait 10 more years, according to the franchise granted to the telephone company, to purchase or get an option for the purchase of the properties of the company.

V V

Ovid Telephone Co. Purchased

H. H. Griswold, owner of the Trumansburg (N.Y.) Home Telephone Co. and the Ontario Telephone Co., Phelps, N.Y., has purchased the Ovid (N.Y.) Telephone Co. The Ovid company, for the past 30 years managed by Harry J. Williams, will change hands on May 1.



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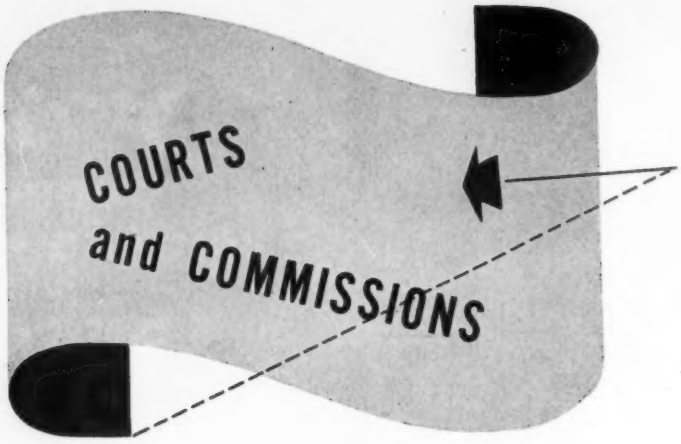

Pennsylvania Supreme Court Upholds "Racing" Service

Ruling that betting is not a necessary attendant of horse racing, Pennsylvania's Supreme Court handed down an opinion April 11 directing the Pennsylvania Public Utility Commission to authorize the Bell Telephone Co. of Pennsylvania to restore telephone and teletype service to Pennsylvania Publications, Inc., which publishes racing information from tracks throughout the country. (TELEPHONY, May 15, 1943, p. 28.)

Written by Justice James B. Drew, the decision reversed the commission and the state Superior Court, which had upheld the telephone company in notifying the William Armstrong interests of New York, owners of Pennsylvania Publications, that telephone service would be cut off, beginning January, 1943.

While wire companies are limited to lawful service, Justice Drew stated, they "are not justified in refusing service to persons engaged in legitimate enterprises merely because such subscribers may furnish information which may enable others receiving it to use the same illegally."

Publication of horse racing news and horse racing itself are not illegal in Pennsylvania, he said, adding that "there is nothing inherently wrongful in horse racing."

"A racing publication conveying information such as does the paper of the appellant, though useful to the gambler in placing his wages, is not a device or apparatus for gambling," the opinion declared.

"Similarly, the publication by newspapers of the country or the announcement over the radio of the results of baseball and football games, prize fights and other such activities may be an aid to gamblers, yet no one would seriously contend that the furnishing of such news was against the public policy of the Commonwealth, and therefore such newspapers and radio stations should be deprived of telephone or teletypewriter service."

Noting that there was no evidence that the appellant was engaged in an unlawful enterprise, Justice Drew asserted it "would be just as absurd to contend that manufacturers of playing cards and dice were aiding and abetting gambling and should be denied telephone service because policemen found such objects when raids were made."

V V

Canadian Court Rules Against Tax on Poles

In a judgment of wide interest the Superior Court has denied the right of the City of Montreal to impose a business tax upon the poles, wires, conduits and station equipment of the Bell Telephone Co. of Canada. Judgment in this sense was delivered on March 22, by Chief Justice W. L. Bond, who declared "Ultra vires, illegal, null and void the tax roll of the city for the year 1943, insofar as it purported to impose and levy the business tax on the telephone company in respect to its ownership and use of the poles, wires, overhead cables, underground cables and conduits and station equipment."

Basing the annual rental value of the said equipment at $520,600, the city levied upon the telephone company a business tax of $56,224.80 for 1943. By its action, the company attacked the validity of this tax. While admitting liability for the business tax in respect to the annual rental value of the offices, buildings and other premises, the company contended it was not liable for a business tax in respect to poles, wires, etc.

The city, in contesting the action, maintained that the plant and equipment in question fell legally within the meaning of the term "premises" in which the occupation of the plaintiff company was carried on, and therefore were subject to the business tax.

The chief justice upheld the contention of the company. In its judgment the court said the city in 1943, apparently for the first time, asserted a right to exact a business tax upon the annual rental value of the equipment in question. No doubt the city might impose taxes for certain purposes upon immovable property including such as was now under consideration, but with regard to the business tax, the chief justice said, the authorization conferred was not an authorization to impose a tax on all immovables. It was restricted to a tax upon premises occupied for certain purposes and "in which" the business was carried on. Unless these poles, wires, conduits and station equipment could fairly be said to be premises occupied they did not fall within the provisions of the city charter authorizing the imposition of a business tax in respect to them.

The court's opinion was that the word "premises" was not an apt word to describe such property. "Premises," within the meaning of the Workmen's Compensation Act, the chief justice noted, was "that portion of an employer's land where he carried on business in which employes were engaged."

"It must be kept in mind," added the chief justice, "that these poles, etc., are taxable as immovables under other provisions of the city charter, but in the present instance this is a personal tax payable by the company and it is only for the purpose of fixing the amount of that tax under the by-law that reference is to be had to the annual value of the premises in which the company's business is carried on. The absence in this connection of any reference to 'immovables' or 'immovable property' of the company is very significant.

"The reference is only to the prem-

ises in which the business is carried on and it is thus much more restricted than would have been the case had the words 'immovable property' been used, seeing that by the definition in the city charter itself the words 'immovable property' expressly include poles, wires and conduits.

"On the whole, I reach the conclusion that the expression 'premises in which the business is carried on' is not sufficiently clear and unambiguous to warrant its extension within its terms. As a consequence, the inclusion of these poles, wires, conduits and station equipment in the defendant city's tax roll for the purpose of assessing a business tax thereon is illegal and utra vires."

V V

Missouri Telephone Bill Dies in Senate Committee

The bill to give the People's Telephone Exchange, Maryville, Mo., a permit to operate as a public utility died in a Missouri Senate Committee April 15, after being passed by the state House of Representatives on April 6. (TELEPHONY, Apr. 15, p. 26.) The committee's vote was reported 6 to 4 against the measure.

The commission recently denied the People's exchange a permit which Emmett L. Bartram (Rep.), Maryville, sponsor of the bill, insisted was necessary to obtain long distance telephone service for rural subscribers. Opponents charged the measure would open competition between utility firms, not only in Maryville, but also in other communities with similar situations.

V V

Republican Wins Nomination as Nebraska Commission Chairman

Duane T. Swanson, chairman of the Nebraska State Railway Commission, won the Republican nomination for that office in a field of eight candidates, receiving 10,000 more votes than his nearest competitor, John B. Quinn, former manager of the Stassen presidential campaign in that state.

The Democrats nominated Will M. Maupin, former member of the commission, although the state organization openly fought him because he has been an open critic of the administration. Mr. Maupin made his campaign on the declaration that if elected he would not accept dictation from Washington in the performance of his duties as a commissioner, an open flaunt at the Office of Price Administration which has insisted on being advised of every application for increase in telephone rates. Mr. Maupin broke with the administration when, as a member of the commission, the REA notified the body

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that if it enforced the state law requiring payment to telephone companies where parallel lines of REA destroyed grounded service, it would not build such lines.

V V

Surcharge Case Continues; C. & P. Proceeding Dropped

An order was adopted on April 11 by the Federal Communications Commission directing that a hearing be held with respect to complaints of the American Hotel Association, Bowman-Biltmore Hotels Corp., and the Hotel Association of Washington, D. C., against the American Telephone & Telegraph Co. and associated companies, regarding the merits of the telephone companies' tariff provisions banning collection by hotels of surcharges on interstate and foreign long distance telephone toll messages. (At the present time there is pending litigation relating to the question of the FCC's jurisdiction to regulate such surcharges.)

Commissioners Walker and Wakefield are authorized to conduct the proceedings in the present hearing, to begin May 17, and to submit appropriate reports. (TELEPHONY, Mar. 11, p. 26.)

* * *

Inasmuch as the Chesapeake & Potomac Telephone Co. has filed a new tariff schedule cancelling the schedule previously filed with the FCC which provided that a service charge not to exceed five cents could be made by hotels, apartment houses and clubs in the District of Columbia on each interstate interzone telephone message within the Washington metropolitan area, the commission on April 11 dismissed the proceeding in docket No. 6576. This action is in line with action previously taken by the District of Columbia Public Utilities Commission with respect to the collection of surcharges on interzone calls within the Washington metropolitan area.

V V

Five Damage Actions Settled at $1,000 Each

Five lawsuits for a total of $95,000 damages for five automobile accident deaths March 20, 1942, against the American Telephone & Telegraph Co. of New York and W. F. Wright and J. H. Lopez, Cedartown, Ga., individually and as partners, have been settled for $1,000 each in Memphis, Tenn.

A. C. Muir, administrator, sued for $30,000 for the death of Glen Stephens, $20,000 for the death of Hazel G. Stephens, and $10,000 for the death of Gloria Gail Shelby, infant. F. J. Shelby sued for $20,000 for the death of his wife, Lula, and L. P. Aycock, administrator, for the estate of Virginia Aycock, sued for $15,000.

It was charged that the defendants' negligence caused the accident. The contractors had excavated for a cable for the telephone company and dirt piled on the highway became muddy, causing the automobile, enroute from Memphis to West Memphis, to skid into a bus.

The Tribulations of An Editor

Getting out a magazine is no picnic.

If we print jokes people say we are silly;

If we don't, they say we are too serious.

If we clip things from other magazines, we are too lazy to write them ourselves;

If we don't we are too fond of our own stuff.

If we don't print contributions, we don't appreciate true genius;

If we do print them the magazine is filled with junk.

Now like as not someone will say, "We swiped this from some other magazine"—we did.

V V

Council Denies Occupation Tax

The Lincoln (Neb.) city council, after a week's deliberation, on March 27 voted down the ordinance proposing a 1 1/20 per cent occupation tax against the Lincoln Telephone & Telegraph Co.'s gross earnings (TELEPHONY, Mar. 18, p. 40).

V V

Summary of Commission Rulings and Hearings

Federal Communications Commission

April 12: Order issued granting authority to the Southern Bell Telephone & Telegraph Co. and the Southwestern Bell Telephone Co. to supplement existing facilities from Shreveport, La., to Center, Tex., and Nacogdoches, Tex., at an estimated cost of $20,825.

April 12: Order issued granting authority to the Chesapeake & Potomac Telephone Co. of Virginia to supplement existing facilities between Strasburg and Harrisonburg, Va., at an estimated cost of $18,000.

Kansas State Corporation Commission

March 22: Order issued approving the refiled local tariff of the Southwestern Bell Telephone Co. for the Coffeyville-Dearing (Kan.) exchange.

April 24: Hearing on the application of Trenton Stark, the Belmont Telephone Exchange, for authority to make certain changes in rates for telephone service at Belmont.

May 8: Hearing on application of Virgil Whittington for authority to make certain changes in rates for telephone service of the Weir City Telephone Co., Weir.

May 15: Hearing on application of the Edwards County Mutual Telephone Co., Lewis, to make certain changes in rates for telephone service in that city.

Nebraska State Railway Commission

May 3: Hearing on application of the Garfield (Neb.) Mutual Telephone Co. for an increased rate schedule.

Oklahoma Corporation Commission

May 24: Hearing on application of H. H. Harris for increased rates at the Duke (Okla.) Telephone Exchange. B. Richardson, telephone engineer, has been directed to make an appraisal of the property and Paul Reed, commission auditor, is to examine the books and accounts of the company, reporting before the date of the hearing. At a recent meeting in Duke, subscribers there approved the proposed rate increases with the understanding that certain improvements would be made by Mr. Harris.

Wisconsin Public Service Commission

April 21: Hearing in Eau Claire on application of the Eau Claire (Wis.) County Telephone Co. for authority to increase rates for telephone service.

V V

Four Oklahoma Exchanges Change Owners

Nelson Eldred recently sold the Newcastle (Okla.) Telephone Co., comprising 80 telephones, and has purchased from W. M. Porter the Cleo Telephone Exchange, Cleo Springs, with 75 owned and 75 switched telephones.

H. H. Harris has traded the Drummond (Okla.) Telephone Exchange with W. C. Lovely and has taken over the Oakwood (Okla.) Telephone Co. The Oakwood property has about 100 telephones and the Drummond exchange has 75 owned and 10 switched telephones.

It is understood that the Oklahoma Rural Telephone Co., Enid, will remove its switchboard at Drummond, which had been operating in partial competition with the Harris exchange there, through an agreement reached with Mr. Lovely, new owner of the Drummond Telephone Co.

V V

Pennsylvania Association Reduces Membership Dues

The directors of the Pennsylvania Independent Telephone Association recently voted to reduce assessments for active membership by one per cent per station, according to a recent announcement by Executive Secretary H. M. Stewart.

"This is the third consecutive reduction ordered by the Pennsylvania association in three years," Mr. Stewart

said, "and in addition to these cuts a substantial reduction has been made in charges to active members for toll clearing service. These adjustments have been made without curtailing or impairing the association's activities. The association's executive office reports that the adjustments are not due altogether to steady increases in the number of revenue-producing stations in active service. Close cooperation on the part of a full and active membership is, in a large measure, responsible for a substantial portion of these reductions," he reported.

"The association's membership represents more than 95 per cent of the 315,000 Independent telephones in the state, including every one of the 26 A and B companies, with aggregate gross revenues of $12,000,000 annually. All but one of the 10 class C companies, with gross revenues of more than $400,000, and all but three of 17 class D companies are active members of this association. Only 44 of 138 class E companies and a smaller percentage of the class F group are members," the secretary said.

V V

OBITUARIES

HAROLD C. CUNNINGHAM, 48, chief clerk of the supply division of the Lincoln (Neb.) Telephone & Telegraph Co., died of a heart attack at his home in Lincoln, April 14. Mr. Cunningham had been in the employ of the company nearly 32 years. He was a veteran of the first World War, and a member of the Independent Pioneer Telephone Association. A son, William Cunningham, is a member of the Army air force.

* * *

JUNE G. STREAM, 56, wire chief of the Two States Telephone Co., Texarkana, Tex., until health forced his retirement almost a year ago, died recently in a Texarkana hospital.

Mr. Stream has been with the Two States company for 30 years. He was an employe of the old Independent firm, the Texarkana Telephone Co. and continued in the employ of the Two States company when that organization merged the Independent concern and the Southwestern Bell company in 1913.

He is survived by his widow, his mother, three sisters and a brother.

* * *

J. J. ODLE, owner and manager of the Parsons (Tenn.) Telephone Co. and also a director of the Tennessee Independent Telephone Association, died April 1 following an illness of about three months. He is survived by his widow, five daughters and one son.

Federal Telephone Tax Derided by Newspaperman

The new federal tax on telephone service recently was ridiculed in a syndicated column by H. I. Phillips, who also wonders if such service isn't misclassified as a luxury. In his humorously satirical manner, Mr. Phillips states:

"Of all the new taxes the increase in those on telephone calls seem the hardest to understand. From now on you will pay 25 per cent on out-of-town calls and 15 per cent on every local call. That runs into folding money.

"And we can't see the logic. Does Washington hold that telephoning is an amusement?

"Would anybody claim it's a pleasure under war conditions?

"And no matter how ornamental those telephone instruments may be manufactured you can't classify them as costume jewelry, can you?

"Maybe the tax framers hold that conversation is a luxury. Perhaps Washington feels we are all talking too much.

"We had come to think the telephone was a household necessity, almost like water and gas. We used to possess a telephone in the belief it was an economical convenience. Now we just sit around worrying over a fear that somebody may use it for an outside call.

"The oldtime light-hearted manner of the average telephone user is shrinking up. There used to be laughter and gay chatter on the wire. Now it's a business venture.

"A 25 per cent tax on out-of-town calls is terrific even if you refuse to pay it. It is almost as expensive to go out of town by telephone as it is by auto.

"And a tax of 15 per cent on your bill for local calls from your own bungalow is disturbing. You're losing money the minute you take off the receiver and give central the number.

"By the time you've said 'Is this you, honey?' you're in debt over your head.

"And if she is a slow talker you're slated for bankruptcy.

" 'Call me up sometime,' used to be accepted as a friendly expression of regard. It now becomes an invitation to extravagance.

" 'Have you a telephone?' you are asked today. And if you have any sense of thrift you say, 'Yes, but only for incoming calls. Don't expect me to call you.'

"Approaching the telephone with the manner of a man about to take a terrific fling with his money, we are going to put in a call to Mr. Morgenthau. We are going to ask him one question:

" 'How can there be any talk of freedom of speech with a 25 per cent tax on this very question, Henry?'

"We pause for a reply. And if Henry is careful with his money, we won't get it by telephone."

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Lightning Protection of Aerial Cable

(Concluded from page 19)

insulating paper so that breakdowns frequently occur with voltages insufficient to operate the protectors. This factor accounts for the increase in trouble during 1940 (shown below). January of that year was marked by an exceptionally bad sleet storm which brought down hundreds of power wires, damaging cable at many locations.

Year	*Troubles Charged to Lightning*	*Troubles Per 100-miles of Sheath*
1937	202	50.80
1938	158	37.50
1939	85	20.60
1940	144	30.50
1941	72	15.75
1942	82	17.00
1943	79	16.25

While these results are gratifying and have lowered cable maintenance costs over $8,000 annually, it is felt that further improvement can be effected. Much of the trouble remaining is due to poor station protector grounds, weakened dialectric strength of paper insulation in cable and lack of cable protection for some aerial wire serving exposed locations. Corrective measures required for troubles of this type must be applied after study of the specific case involved. The methods which have proved effective in similar cases will be discussed in detail later.

It is realized that the adoption of the plan advocated here will place a great many additional protectors in the telephone cable plant. This will be true particularly in the outskirts of suburban areas and in rural communities. Such a proposal may be viewed with alarm by many wire chiefs, who may consider the protectors already installed are more of a nuisance than they are worth. Lack of appreciation as to what can be accomplished in preventing cable trouble by the use of protectors is understandable.

The large numbers of individual cable pairs that are found open, crossed and grounded following an electrical storm are generally only a small portion of the total troubles handled during such periods. Many troubles never come to the wire chief's attention as the line is merely changed to another working cable pair. The cable burns with which maintenance men are most familiar are those repeated troubles which too often occur at terminals where open wire lines are connected. Many of these lines are already protected and such troubles are generally viewed by workers as failures of the cable protection to function.

In addition, every wire chief has a distinct and unpleasant recollection of protectors in trouble due to wet protector blocks. Troubles of this nature are particularly annoying because they generally appear to a tester, already overloaded with storm trouble, as a cable failure. This often results in the dispatching of a cable crew to the job at a time when their services could be used to better advantage at some location where real cable trouble exists.

The problem of wet protector blocks has been solved in one type of protector for cable terminals by the development of a shield which forms a tight-fitting cover over the front end of the blocks and prevents the entrance of moisture. This simple and ingenious device is merely a thin piece of rust resisting metal, bent at right angles to form the cover and cut to size for insertion between the ground plate and the top of the protector mounting.

Obviously, even the best protector is of little value if blocks are missing due to the carelessness of some workman in not replacing them. Also, when any broken springs are discovered the entire mounting should be replaced, even though protection may be provided by transferring the working lines to spare springs. The probability that further crystallization and breakage of springs will occur and leave the cable without protection presents too great a risk.

Some authorities are of the opinion that the inspection of protectors on an annual or bi-annual basis is warranted. When these inspections are made, the faults located and corrected, they often do not appear to warrant the cost. This may be true even when we assume that each major defect discovered would have resulted in a cable burn costing 50 dollars to clear. To prove this point we must, however, consider the fact that very few cable burns, when carefully checked and analyzed, are found to be due to a defective protector.

A good method of keeping protectors in operation and good condition at all times is to have workmen, who have occasion to visit terminals, equipped with protectors held strictly accountable for their condition. This inspection should be simple, easy to accomplish and cover the following points:

(1) The number of aerial wires protected should equal or exceed the number appearing in the aerial terminal.

(2) There should be no missing or broken springs in the protector terminal.

(3) Protector blocks should be in place for each pair of wires terminated in the protector terminal.

(4) Shield to prevent the entrance of moisture should be provided and in place if the terminal is of a type requiring this precaution.

(5) It should be impossible to move with the fingers the clamp used to attach ground wire to the cable strand or the ground wire connected in the protector terminal.

(6) Protector terminals should be checked to make sure they are closed as a last step in the inspection.

Many companies issue quality ratings on the job performed by workmen. Supervisors charged with the responsibility of quality ratings should check protectors as a matter of course and penalties imposed for neglect should be severe.

The number of protector blocks at cable terminals which ground due to arcing is comparatively few and need not be given special consideration. In the majority of cases, an electrical discharge sufficient to break down the paper insulation in the cable will arc across the blocks only during the period of the charge. Any current sufficiently great to ground the blocks permanently would certainly break down the cable and it is obviously less expensive to change protector blocks than to make an extensive cable repair.

Until recently, skepticism as to the value of cable protectors in preventing electrical troubles was shared by the writer. It has since been demonstrated that they will do the job for which they are designed and they can be kept in good operating condition at a very reasonable cost.

It has been definitely proved that the bulk of scattered electrical cable burns can be eliminated by the provision of some additional protectors in outlying areas. There still remains, however, the problem of repeated troubles at locations thoughtfully protected. These generally occur at points terminating long open wire lines.

(To Be Continued)

V V

Diamond State Company Honors Safe Drivers

The Diamond State Telephone Co., Philadelphia, Pa., recently honored four of its employes who have driven company motor vehicles a total of 500,000 miles without causing an accident.

Two of the men were made members of the Hundred Thousand Mile Club, company safety organization made up of men who have driven ten years or more safely. The other two men were honored for having completed an additional five years of safe driving since joining the club, bringing each man's total to 150,000 miles.

Walker, Executive Secretary Of New York Association

Don W. Walker, formerly secretary and general auditor of the telephone operating companies of the Community Telephone Co., with headquarters at Clinton, Ill., has been appointed executive vice president of the New York State Telephone Association, Albany, succeeding C. Wm. Rich, who recently resigned that position to accept an appointment as executive assistant to the chairman of the Ways & Means Committee of the assembly of New York State.

DON W. WALKER

Mr. Walker is well-known throughout the telephone industry and because of his wide experience in general telephone work, he is particularly fitted for the duties of his new association post. Mr. Walker took over his new position April 1.

He began his telephone career in 1930 with the Western Light & Telephone Co., Salina, Kan., holding various positions with that company until 1938 when he became assistant secretary and general auditor of the Blue Mountain Telephone & Telegraph Co., Wiconisco Telephone & Telegraph Co., and the Southern Telephone & Telegraph Co., with headquarters at Bangor, Pa., all of which are associated with the so-called Gary group. In 1941, Mr. Walker transferred to Fort Wayne, Ind., and became commercial representative of Telephone Services Inc. In November 1942, he was transferred to Clinton, Ill., as secretary and general auditor of the Community companies, which position he held until his appointment as executive secretary of the New York association.

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Battery Charging Equipment

(Continued from page 23)

smoothing the commutator, replacement of brushes, etc. Other types of equipment involve cleaning, replacement of rectifying elements or other parts, cleaning contact surfaces of relays and switches. The accessibility of parts that may require replacement or attention should be considered.

As far as operation is concerned trickle and automatically-controlled charging equipment naturally require the least attention. All types of equipment should be checked now and then to determine whether the temperature rise is within normal limits. If the temperature is higher than the limit set by the manufacturer, the charging current should be reduced. Charging equipment output is based on an ambient or room temperature of a stated value, so even with normal output the temperature may rise to an excessive value if the room temperature is high or ventilation around the equipment is poor. Automatic equipment should be checked now and then to see that it cuts in and out at the required voltage or current values. The equipment should not allow the battery to discharge through it when the power fails. If it is necessary to re-start the equipment manually after a power failure, a no voltage alarm is desirable. If the charging resumes automatically after the power is restored, it should not cause any disturbances in the telephone equipment or lines due to a sudden rise in voltage.

Space Requirements for Charging Equipment. PBX's require a compact quiet charger; rotating equipment requires a mounting that will not vibrate. Some types of equipment are not bulky up to 10 or 12 amperes output, but beyond that size, space requirements become excessive. The output ratings are based on the assumption that the charger will be located where the air is free to circulate, so the location should be considered from a ventilation viewpoint. The location should be such that the heat from the charger will not interfere with other equipment. The more inefficient the charger, the greater will be the heat radiation for a given output.

The charger should not endanger personnel by electrical shock, burns or injury from moving parts. There should be no physical connection between the power input and the DC output circuits. Insulating (sometimes called isolating) transformers should be used. The power supply should be insulated from the telephone channels by insulation capable of withstanding at least twice the normal line voltage plus 1,000 volts rms for one minute.

The equipment should comply with the requirements of the Fire Underwriters and the local and national Electrical Codes.

Telephone men take pride in the appearance of their plant, therefore, the appearance of the charging equipment is important also, especially if visible at a PBX location.

Automatic control may be applied to either generators or rectifiers and may be a constant current type, a constant voltage type or a combination of the two. The principal types are discussed below.

The *ampere-hour meter* type starts up the charging equipment when a certain number of ampere-hours have been discharged and stops the charge when the required number of ampere-hours have been replaced in the battery.

The time switch type is a small, self-starting 60-cycle synchronous motor time switch, which periodically closes a circuit (such as once per hour) and if the battery voltage is below a certain value, the charging equipment is started. A voltage relay stops the charge when the desired voltage is reached.

The *voltmeter relay type* starts the charge when the battery voltage drops to a predetermined value and stops the charge when the battery voltage reaches the required value.

The *voltmeter relay type* varies the charging rate according to the load. When the load falls to approximately zero, the battery is trickle charged at a low rate. The current drain in a common battery telephone exchange never actually falls to zero as the combined leakage of all lines is an appreciable amount.

Float Charging Equipment without Relays or Other Moving Parts. Only part of the variation of the charging current in following the load is due to circuit changes caused by relay or switch contacts in automatic charging equipment. As pointed out previously, charging equipment that has constant voltage characteristics inherently will follow the load. Good voltage regulation may be obtained without relays or switches, but this is achieved at the expense of efficiency if close limits are to be maintained.

In some arrangements, two or more rectifiers are used in parallel. A constant voltage rectifier is normally connected to trickle charge the battery at no load and to charge up to its full capacity as the load comes on. When the load reaches the full capacity of the first rectifier, a relay connects a constant current rectifier in parallel with the constant voltage rectifier. Additional constant current rectifiers are cut in automatically as required. As the load drops off the constant current rectifiers are disconnected one by one until only the constant voltage rectifier remains.

Automatic charging equipment should be equipped with a manual control for use when it is necessary to give the battery an equalizing charge.

For charging rates of less than 25 or 50 amperes rectifiers are usually employed, however, a number of rectifiers may be operated in parallel where more output is desired. The usual sizes are 1, 3, 6, 12, and 30 amperes. The principal types are:

Electrolytic: Consists essentially of metal electrodes immerged in an electrolyte.

Dry Disk: The rectifying elements usually employed in telephone practice consist of metal disks coated with a copper-oxide or selenium.

Bulb: The rectifying takes place at electrodes in a glass bulb filled with argon gas or mercury vapor. Other gasses or combination of gasses are also used.

For telephone work the full wave type, equipped with an adequate filter, should be used.

Diverter pole generators are generally used for charging rates of 25 to 50 amperes or more. These generators have good regulation; the variation between 10 per cent and 100 per cent load is only about one per cent. Above 100 per cent load the voltage drops off, thus shifting part of the load to the battery. If a full-floating charging system is desired, additional generators may be cut in automatically as the load increases. They can be arranged to divide the load according to their capacity. A 25-ampere machine may be normally connected across the battery and when the load reaches 25 amperes a 50-ampere generator cuts in.

At loads above 25 amperes, the 25-ampere generator will supply one-third and the 50-ampere generator two-thirds of the current. These generators may be driven by separate electric motors or may be machines with two windings on one armature. In single unit machines, the power input should be well insulated from the DC output. In the past, expensive generators with a relatively large number of commutator segments were necessary to prevent noise in the telephone channels, however, with the advent of improved

filters, commercial type generators may be used.

Let us consider the current requirements of an imaginary 500-line, five-position, 24-volt common-battery telephone central office.

	Ampere-hours in 24 hours
Operators transmitter current, 0.1 amp. x 70 (total operators hours in 24 hours)....	7.0
Line leakage, $\frac{\text{500 lines x 24 volts}}{\text{Average line insulation 40,000 ohms}} = 0.3$ amps.	7.2
3,000 calls per day of three minutes each at 0.25 amp. per cord circuit	37.5
Line relays and lamps.....	1.5
Toll circuits, alarm circuits, etc., and battery losses.....	10.0
	63.2

The busy-hour load would be about six or seven ampere-hours with peaks of short duration of about 12 amperes. To full float, the battery would require a charger of 12 amperes capacity. A three-ampere charger would be sufficient on a trickle charge basis. The above figures are only a rough approximation. Actual cases should be figured in more detail.

The total power required will depend on the load and the efficiency of the charging equipment. A three-ampere trickle charger will use in a year a total power which is 24 hours x 365 days x 3 amperes x 23.65 volts (11 cells at 2.15 volts per cell), which in turn totals 621 KWH. This value should be divided by the efficiency of the charger. At 75 per cent efficiency the total power would be 828 KWH; at 50 per cent, 1242 KWH; at 25 per cent, 2484 KWH. At three cents per KWH the 75 per cent efficient charger would cost $49.68 less to operate than the 25 per cent efficient charger. A 48-volt central office which has a daily demand of 1,000 ampere-hours (total for 24 hours) would require about 24,000 KWH per year at 75 per cent efficiency, 36,000 KWH at 50 per cent efficiency. At three cents per KWH the difference would be $360.00. The efficiency of the different types of chargers at various loads is usually stated by the manufacturers. Frequently a small charger for use during periods of light load will pay for itself in a relatively short time.

The yearly cost of replacement parts, maintenance material and depreciation should be added to the yearly power expense to be used in determining what first cost is justified. These items are reasonably accurate as they are based on past experience and on information supplied by the manufacturer.

A justifiable first cost can be deter-

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mined by comparing the costs of the various chargers that meet the requirements and adding the yearly expense for the number of years expected use. Sometimes a charger with a higher first cost will prove more economical in the long run.

Of course, labor saved by automatic equipment should be considered in the cost. Fully automatic equipment costs more, therefore, the question is "Would you sooner snap the switch yourself or is it worth the extra cost to have some gadget turn the charging current off and on?" Perhaps the automatic equipment has a better memory and won't forget to turn it off and on at the right time. Increased battery life due to float charging should also be considered.

The value of some of the charger requirements, such as reliability, are difficult to express in dollars, while other requirements can be so expressed. For instance a gain of one db in transmission, due to an improved transmitter battery supply, where the present level is satisfactory may be expended by the use of smaller gage cable which may be translated into dollars. Under certain conditions, the transmitter current supply loss plus the voice frequency loss of one mile of 24-gage cable is one db more than the 22-gage losses. Power efficiency can of course be easily expressed in dollar values.

Available data should be studied in detail when selecting telephone battery charging equipment. The amount of saving in money and improvement in service that may be realized by the use of such equipment might prove to be surprising.

V V

Conserving Critical Materials

(Continued from page 29)

stitute with complete satisfaction. Tie wire of copper-clad steel, instead of pure copper can and should be used for ties on copper wire.

Care should be exercised when removing old wire so that it may be re-used as required. Defective sections and twisted sleeves should be removed and the good sections re-spliced by the use of compression-type sleeves. In the repair of storm breaks the old wire should be re-used to the greatest extent possible.

Replace glass insulators on open wire only when they are broken to the extent that they may cause trouble. Defective crossarms should be removed from service only after they have outlived their usefulness and weakened to the point that they are certain to cause trouble.

Truck Equipment: All motor equipment should be carefully inspected at fixed periods so that small repairs and adjustments will be made to avoid all preventable breakdowns. The paint on the bodies of these vehicles should never be neglected as paint prevents corrosion and insures extended service.

Because of the continued acute rubber shortage certain driving restrictions such as maximum speed should be observed carefully. Load carrying capacities and tire pressures should be observed at all times on both trucks and trailers. Rotation of tires to equalize wear and frequent inspection for foreign particles should also be made.

Telephone Tools, Their Use and Care: Maintenance and construction personnel should be made to understand that tools of all types are extremely critical and that every effort should be made to permit the ones we now have to last until such time that new ones may be procured. Every effort should be made to make men realize that tools are a basic factor in winning this war. Not

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a tank, plane, ship or gun can be built or operated without them. It requires pliers, screw drivers, chisels, wrenches and hammers by the ton to keep a mechanized army rolling.

Files if used properly will last much longer than when abused. The mushroom heads of cold chisels may be ground off to extend their life. Broken hammer or axe handles can be replaced with very little cost or effort to make them like new. Shovels and spades may be straightened and sharpened with very little effort. Damaged blades on screw drivers may be re-pointed easily. The leather of linemen's belts and climber straps should be treated with neatsfoot oil occasionally. A little effort will pay large dividends in tool conservation.

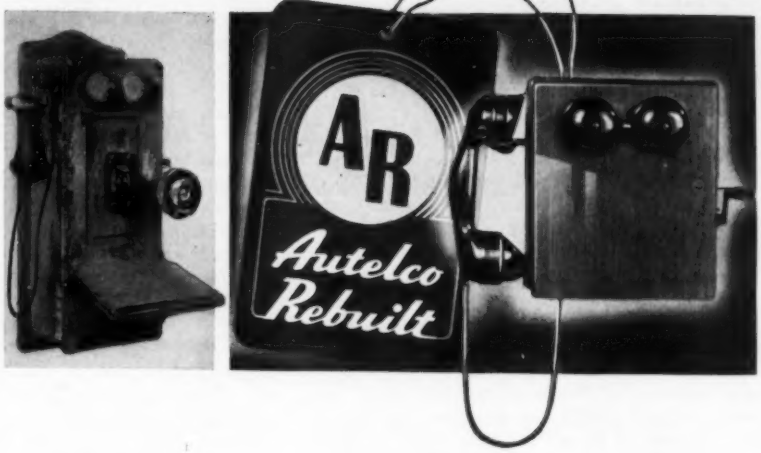
Recovery and Re-use of Materials: Every effort should be directed toward the recovery of material in such a manner that it may be re-used to the best advantage. Copper wire should be carefully removed to avoid nicks and kinks and then coiled on standard reels. Crossarms should be handled carefully during removal to avoid damage. Pole line hardware, after removal, should be sorted and all good pieces retained for re-use. Cable terminals should have the stubs sealed and protected against mechanical injury until required for re-use. It will be surprising how much recovered material will be found suitable for re-use if only a few simple precautions are observed.

This article covers only a few of the many possible means of conserving critical telephone materials. It is also realized that many of the rules here suggested may not solve all of the problems telephone companies are forced to meet in these trying times. It is hoped, however, that these ideas may at least serve as examples and suggest ideas that will result in the conservation of critical materials and equipment for war.

ANALYZE AN ACCIDENT

A thorough and impartial investigation of each serious accident is productive of results. This investigation should bring out three things: (1) The fundamental cause of the accident; (2) who was responsible for it, and (3) what steps should be taken to prevent a repetition.—O. S. HOCKADAY, *Superintendent of Transmission, Texas Electric Service Co., Fort Worth, Tex., discussing "Safety in Small Groups" in the Industrial Safety Review magazine.*

"Returned to Active Duty"



In the two years since Pearl Harbor, more than 70,000 old telephones have been returned to active duty by Autelco Rebuilding. Some came out of years of retirement in telephone company storerooms—others, damaged in service, were rushed to us for "hospitalization." All were completely dismantled, carefully inspected in every part, refinished, and assembled again into good-as-new instruments, ready to go back "on the line."

During these war years, Autelco Rebuilding experts have also applied their skill to large quantities of switchboard, power and signaling equipment, and to innumerable manual, magneto and automatic switchboard units. Thus, Autelco Rebuilding has made an invaluble contribution to the Telephone Industry's program of conserving manpower and critical materials.

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Small Exchange Circuit Analysis

(Continued from page 48)

especially during lightning storms. Formerly it was necessary for the operator to plug into all lines to extinguish the line lamps after they had been brought in by lightning surges on the lines. With this feature, however, it is only necessary to operate a single key which removes battery from the No. 1 springs of all line and lamp relays. In some instances, this feature is provided by a key with multi-contacts strapped together to safely carry the heavy current required by the large number of lamps lighted. Also the release key may be used to operate a relay which is equipped with large contact surface to care for the heavy current. This current, using the key method, is shown in *Fig. 8a* and the relay method in *Fig. 8b*.

The line pilot lamp *(Fig. 9.)* lights each time a signal comes in over a subscriber's line. Ground for locking-up the line relay is provided through the five-ohm winding of either the long or the short line pilot relays. Incoming calls from a long line will establish a circuit for the long pilot lamp by operating relay B, except when the code alarm relay is operated. This key removes ground to the lamp at contacts 5 and 6, which results in considerable current saving as the average operator does not always plug-in to release all lines promptly. When the code alarm key is operated the lamp will not light in response to the calls because its ground is removed at contacts 7 and 8. If the code alarm buzzer indicates that a subscriber wishes to signal the operator, it is necessary for her to restore the code alarm key, permitting all busy line lamps to appear, then plug into each until the proper line is located.

When the short line pilot relay A operates, ground is provided at contact No. 1 of relay A *(Fig. 9)* to light the pilot lamp. Upon the operation of long line relay B, ground is provided for lighting the lamp through contacts 5 and 6 of the code alarm key. When any of the cord circuit supervisory lamps light, ground is provided from contacts 5 and 6 of the code alarm key and through contacts 1 and 2 of relay C, except when the code alarm key is operated.

Ground for sounding the night alarm bell or the day alarm buzzer is provided through contacts 3 and 4 of relay A for short lines and contacts 3 and 4 of relay B and 3 and 4 of the code alarm key for the long lines. Contacts 3 and 4 of relay C also furnish ground for the operation of the supervisory alarm.

With the code alarm key in an operated position contacts 7 and 8 are opened, which removes ground from the long line lamp, preventing it from lighting. Ground at 5 and 6 is also removed from the supervisory and line pilot lamps. The opening of the circuit at contacts 3 and 4 of the long line pilot relay B removes ground from the night alarm bell or the day alarm buzzer. Contacts 1 and 2 are closed completing the circuit from the number 3 contact of the long line relay through relay D to ground. Relay D will operate at the same time as the line relay on long lines when a subscriber turns the hand generator in a telephone. The operation of the code alarm relay provides a circuit for sounding the buzzer E, which responds in accordance with the code ringing of the line.

The slow release relay D is used to

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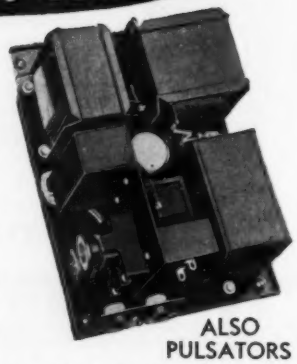

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control the buzzer so that it will not release during the vibrations of the line relay armature which will follow the code ringing from the hand generator. A slow release relay may be explained as a special design with a copper slug or ring placed around the core to delay its action. This copper slug will tend to hold the relay in an operated position for a short interval after the current flow through the winding has been broken.

It will be noticed that the buzzer and bell in *Fig. 9* are equipped with a one M. F. condenser in series with a 500-ohm, non-inductive resistance across their terminals. The purpose of this feature is to prevent sparking or arcing at the contacts. When the contacts open, as the bell or buzzer operates, the magnetic field built up in the winding of the buzzer must collapse, causing a strong "induced current" to flow in the windings. This induced current will flow through the resistance and charge the condenser. The condenser will in turn discharge as the contacts next close. Were it not for this condenser-resistance combination this induced current would discharge across the contacts just as they are opened and cause the precious metal to burn and be ruined in a short period of time.

(To be continued)

V V

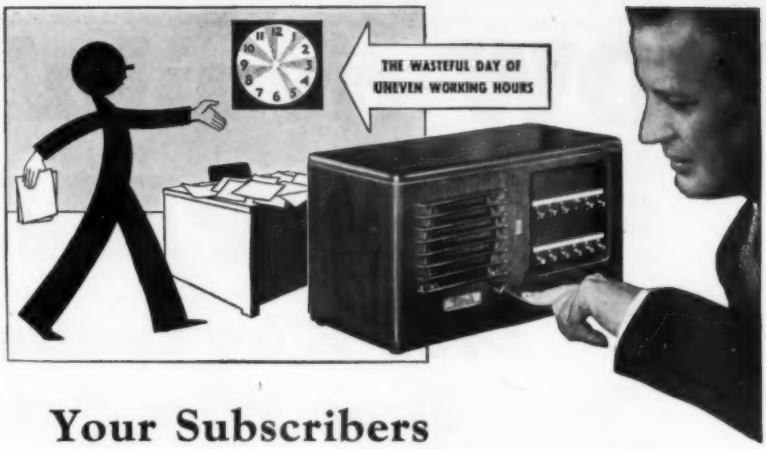
Pike Telephone Co. Acquired By General Telephone Corp.

The Pike County Telephone Co., Pittsfield, Ill., was acquired by the General Telephone Corp. on March 31, according to an announcement by the General company.

The Pike County company operates in Pike and Calhoun counties in southwestern Illinois. It serves 3,527 telephones through 16 exchanges. Of the 16 exchanges, three are common battery, six are magneto, and seven are unattended dial.

At the meeting held in Springfield on March 31, the following directors were elected: C. R. Brown, Walter Dakin, J. F. O'Connell, L. F. Shepherd and A. D. Stevens. The following officers were elected: President, C. R. Brown; vice president, Walter Dakin; vice president, L. F. Shepherd; secretary and treasurer, E. M. Hiestand; assistant secretary, C. M. Doll; assistant treasurer, M. H. Burns, and auditor, A. G. Kiesling.

All of the exchanges of Pike County company are interconnected by a network of company-owned toll circuits radiating from the headquarters at Pittsfield. The principal cities and towns and all of Pike and Calhoun counties are served by this company.



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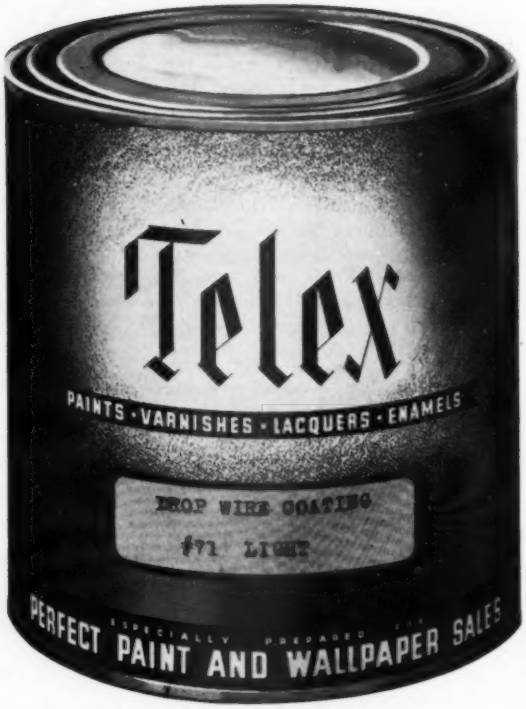
As long as the paint covering is in good condition drop wire deterioration is slow, but as the paint ages the cotton braid is exposed to the weather and the drop wire soon shows the effect, thus requiring replacement much sooner than would be necessary had the paint remained in good condition. Coating weathered drops with the use of this machine will keep considerable amounts of wire in service which would otherwise have to be replaced, and troubles during a prolonged period of wet weather will be substantially reduced.

In order to make these materials available to independent companies, particularly small and medium sized companies, the Diamond Expansion Bolt Company, manufacturers of the painting machine, and Perfect Paint Sales, suppliers of TELEX paints and varnishes, have made arrangements with the leading independent telephone distributors for the sale of the Drop Wire Painting Machine and TELEX Drop Wire Coating.

The above mentioned machine and coating material is available immediately from the following distributors:



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Col. G. W. Custer Named to High Army Post

Col. George W. Custer, Detroit, former chief engineer of the Michigan Bell Telephone Co. has been placed in charge of supply and maintenance of all communications equipment for the Army Air Forces in Britain, according to a recent announcement from an Air Service Command headquarters in England. Col. Custer was commissioned in the Signal Corps in 1927 and was called to active duty in 1941.

V V

Change Positions in Iowa

MR. AND MRS. LENNES NOSTROM have resigned their positions as lineman and chief operator of the Pilot Mound (Iowa) Farmers Mutual Telephone Co., effective April 19. They have held these positions for a number of years, but recently accepted employment with the Farmers Rippey-Angus Telephone Co., Rippey, Iowa, in similar capacities.

V V

Father and Son Join Army

JAMES O. SWAIN, an Ironton, Ohio, repairman for The Ohio Bell Telephone Co., and his son, JAMES, JR., an Ohio Bell frameman from Dayton, are now doing telephone work together for Uncle Sam. Originally working side-by-side in Ironton, they were together when they joined the Army.

Best Story of the Week — What's Yours?

A reader of the Washington *Times Herald* thinks the telephone is a pretty wonderful invention but writes—

"I see all the time many comments in your paper on various problems of the day — political and otherwise.

"My first comment is a complaint and it is otherwise. I would like to say a word against one of our public utilities — the Chesapeake & Potomac Telephone Co., Washington, D. C.

"One year and a half ago I put in an order for a telephone. It was promptly filled and the telephone installed in a very prominent position in my room; the bills have also come in with amazing regularity and have been settled with equal faithfulness.

"Now my complaint is this: I've upheld my end of the contract but they have neglected to fulfill theirs. You see, in one year and a half — the darn thing hasn't rung once."

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Wire Communication in the New Guinea Campaign

Previous newspaper accounts have described how one regimental combat team accompanied by service troops, was moved by rail and water to Port Moresby, then flown across the Owen Stanley Mountains in Army transport planes and committed to action with an Australian division that was then engaged against the Jap forces. Signal Corps officers flew into the combat area shortly before the capture of Sanananda and had time to inspect existing allied Signal agencies before the main body of the division arrived.

Initially, telephone communication between the division and the ORO Bay supply base was provided over two low-grade field wire circuits laid along native trails for a distance of 18 miles. Wire contact with Port Moresby was provided by a ground return Fullerphone circuit that had been built by the Australian forces as they advanced across the mountains through Kokoda. This line had never been measured, but it exceeded by many miles the air-line distance of 100 miles between Port Moresby and Dobudura.

Australian linemen who continued to patrol and maintain this line were stationed at four native villages along the line route. Due to the difficulty of getting men and supplies to these stations, wire teams had been changed only once a month. The natural hazards of lightning, storms and falling trees combined with the danger of attack by enemy patrols made the assignment difficult and dangerous. The mission of the division signal company was as follows:

(Signal Corps Photo)

On this New Guinea line of communication, a palm tree serves as the terminal "pole" for field lines converging at a telephone central.

(1) To build an efficient telephone system for adequate defense of the area, constructed to withstand the almost continuous bombing.

(2) To maintain adequate communication circuits with higher headquarters.

(3) To establish an axis of communication for future offensive action against enemy forces.

The original tactical field wire net that was in use when the division took over the area had been comparatively simple to maintain. As the sector became more stabilized, numerous factors made satisfactory wire communication more difficult. The arrival of additional troop units also required a considerable expansion of the field wire net.

Existing wire lines had been run along native trails or fastened to lance poles and trees when possible. With the advent of the jeep, trails become wider as drivers drove to the side of the original trail to avoid mud holes. Wire lines which had been 10 to 20 yards off the original trail might now be in the center of a newly-cut trail.

Two-man maintenance teams had to be stationed approximately four miles apart along the main wire line routes to patrol the lines and make necessary repairs. Because of the Jap patrol menace, only one man could work while the other stood guard.

Lightning storms which tore out whole sections of the lines in a day, jungle ants which discovered that field wire insulation was edible, and curious natives who found that field wire made the best belts they ever owned, caused frequent disruptions of service.

It was decided, therefore, to replace the major field wire trunks with open wire lines. About 500 circuit miles of open wire lines were constructed by detachments of Australian signalmen who had recently arrived in the sector and such linemen as could be spared from the American signal company.

When possible, the new wire lines were built along all-weather roads recently constructed by engineer troops. Suitable clearance had to be cut through jungle to provide a suitable route for other wire lines.

V V

Setting Net for Spies

Break-up of a nation-wide enemy spy system has been helped by use of what is said to be the largest telephone conference hook-up in telephone history. Whenever Head G-Man Edgar Hoover in Washington wants to bring his field directors together quickly the hook-up is speedily arranged so that all may take part in the conference. In this and other ways he can direct the pursuit of a spy across the continent, or spread the net which closes upon Axis agents at various points.

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OWI Selects A. T. & T. Film For Foreign Program

The American Telephone & Telegraph Co. has authorized the Office of War Information to send the film, "Long Distance," to a number of neutral and allied countries as part of the government's program of informing the peoples of foreign lands about the United States, its war effort and its way of life.

In selecting the picture, OWI officials termed it a portrayal of "outstanding work in the field of community service." Produced in 1941, the film presents the story of the men, materials and machines behind long distance service. It has off-screen narration and musical accompaniment.

V V

Operator Carries On As Male Employes Get Induction Call

Speaking of the manpower situation, here is what faced on official of an oil company who rushed to St. Joseph, Mo., recently from the home office in Tulsa, Okla.:

The St. Joseph office has six employes. On March 2 five of those employes, all men, received draft induction notices.

The sixth employe is a girl—the telephone operator.

COMING TELEPHONE MEETINGS

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 25 and 26.

Indiana Telephone Association, Severin Hotel, Indianapolis, May 3 and 4.

Wisconsin State Telephone Association, Park Hotel, Madison, May 10 and 11.

Pennsylvania Independent Telephone Association, Berkshire Hotel, Reading, May 17 and 18.

New York State Telephone Association, Syracuse Hotel, Syracuse, May 24 and 25.

Oregon Independent Telephone Association, Columbia Gorge Hotel, Hood River, June 23 and 24.

Washington Independent Telephone Association, Columbia Gorge Hotel, Hood River, Ore., June 23 and 24.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 10, 11 and 12.

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DROP WIRE PAINTER

Save Drop Wires now in use.

Paint while still in service with this painter—not necessary to remove wires.

Adds years of life to Drop Wires with this extra protection to the braid.

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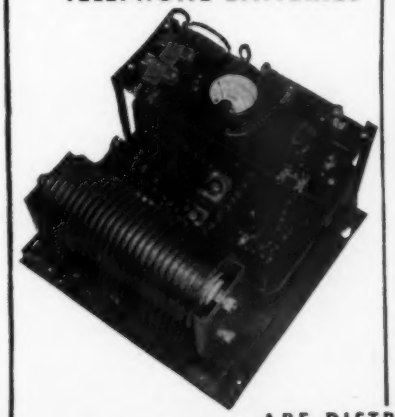

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Army Telephone Center in North Carolina Open

Officials of the Carolina Telephone & Telegraph Co., Tarboro, N. C., attended the formal opening of a new public telephone center at Camp Davis (N. C.) on April 11. The center, especially designed to accommodate soldiers who place long distance telephone calls, is furnished with comfortable chairs, and books are available for those who have to wait for calls to be completed. It was established with the cooperation of the camp signal office.

Company officials present for the formal opening included: L. W. Hill, operational vice president; W. C. Darrow, traffic manager; E. W. Olschner, plant manager, and Jack Havens, assistant commercial manager.

Army officers also attended the program, during which two soldiers whose names were drawn were awarded free calls to their home towns.

V V

"Telethrift"—Sears' New Telephone Shopping Service

The telephone, again, is playing the leading role in a new shopping service called "Telethrift," offered customers of Sears, Roebuck & Co. in Pottsville, Pa.

J. J. Gara, manager of the Pottsville store, on inspecting the new, recently installed telephone shopping equipment explained that customers who formerly had to mail their orders direct to Philadelphia may now use this service by merely telephoning the "Telethrift" office.

Why Buy War Bonds?

"Somewhere tonight an American soldier awaits the command to move forward against the enemy. He is armed with courage—and with the finest weapons America can build. But, to keep going forward until victory is won, he needs more guns, more tanks, more planes. He's depending on *you* to get these weapons to him in a hurry, this boy who may be *your* son, *your* brother, or that youngster next door. Your purchase of War Bonds helps speed these weapons to him. This is *your* war—this is *your* country. *Keep* it yours. Wouldn't it be wonderful if one of your Bonds bought the shell that ends the war in victory for America and her allies?"

Helen Traubel
On "The Telephone Hour."

EXECUTIVE OFFICER, ARMY SERVICE FORCES

COL. DAVID E. WASHBURN, Executive Officer, Army Service Forces, Office of the Chief Signal Officer, was born in Kirk, Neb., October 3, 1890. He served successively from September, 1917 to January, 1918 as private and sergeant in the 178 Infantry Brigade and Air Service. Commissioned first lieutenant, Signal Reserve January, 1918, promoted to captain in September, 1918, and to major in May, 1919. He was honorably discharged in September, 1919 and was commissioned captain, Signal Corps, Regular Army July 1, 1920.

Colonel Washburn was promoted to major in June, 1939; to lieutenant colonel (temporary) in April, 1941; to lieutenant colonel (permanent) in October, 1941 and to colonel (temporary) in February, 1942.

Upon being commissioned a first lieutenant in the Signal Corps in January, 1918, he was assigned to the Office of the Chief Signal Officer, Headquarters American Expeditionary Forces in France where he served until August, 1919. His first commissioned service in the Regular Army was at Headquarters, First Corps Area, Boston, Mass., as assistant to the Signal Officer, until December, 1921 when he became instructor, Massachusetts National Guard.

In October 1923, Colonel Washburn proceeded to Camp Alfred Vail, N. J., where he became senior instructor in the telephone department of the Signal School. In 1927, he entered the Signal Corps School at Ft. Monmouth, N. J., and graduated in 1928. He was then assigned to the Infantry School at Ft. Benning School as Signal Officer. He was then ordered to the Panama Canal Zone from September, 1930 to April, 1932, when he returned to the United States for duty as instructor in the New York National Guard. From May to December, 1933, he was assigned to special civilian conservation corps duty. In August, 1936, he was ordered to Ft. Monmouth and served as Wire Project Officer, Signal Corps Laboratories until July, 1937; Executive Officer until February, 1938 and Acting Director until June, 1938 when he was named Executive Officer.

COL. D. E. WASHBURN

Colonel Washburn proceeded to Washington, D. C., in May, 1940 for duty in the Research and Development Division, Office of the Chief Signal Officer. From November, 1941 to April, 1942, he served as Signal Officer, U. S. Military, North African Mission, Cairo, Egypt, then he returned for duty in the Office of the Chief Signal Officer as a member of the Army Communications and Equipment Coordination Agency, Communication Coordination Division. In March, 1943 he became a member of the Army Communications Board, War Department General Staff, Washington, D. C. The following September he was again assigned to duty in the Office of the Chief Signal Officer, Washington, D. C.

Colonel Washburn was awarded the Purple Heart for World War service at Tours, France, while serving as a major, and by the Republic of France Academy Palms.

Before entering the Army, Colonel Washburn was with the Northwestern Bell Telephone Co.

War-zone Communications on Pacific Island

[EDITOR'S NOTE: *The following story was written by Staff Sergeant Dick Tenelly, of Washington, D. C., a Marine Corps combat correspondent.*]

Aboard a Transport in the Central Pacific—(Delayed)—Now that it's all over and we're on the way back to our rear base, one hears two sides of the story of setting up and maintaining communications in the combat team that took Namur Island from the Japanese defenders.

The communications officer will tell you how well his men worked. But his men will tell you what fun they had. The communications officer is Maj. James O. Bell, Hopkinsville, Ky.

"The men did an excellent job," he says. "There was full cooperation in setting up and maintaining good communications throughout the operation."

Marine 1st Lt. Robert E. J. Mahoney, New Orleans, La., the communications platoon leader, will tell you very much the same thing. And no one who was there will dispute either of them.

But you must ask the enlisted men, such as Pfc. Lester Carlyle, message center, North Plainfield, N. J., and Pfc. Loren D. Gilliam, message center, Vestal, N. Y., for parts of the story that don't belong in officers' reports.

Most of the communicators landed

with the combat team commander, Col. Franklin A. Hart, Washington, D. C., an hour or two after the first assault force. They immediately set up a message center and switchboard in an enemy dugout on the landing beach.

"It was still full of dead Japanese," says a switchboard operator. "But the firing was too heavy around there to take them out. So we just let them lay there."

From the switchboard, telephone lines were strung out—under fire and falling debris from exploding ammunitions dumps—to the colonel's position, to his staff officers, to assault units, to reinforcing units, reserves and shore party stations.

When tanks, half-tracks and tractors were landed, their treads chewed up telephone lines as fast as they were laid. They had to be re-laid, always under possible sniper fire. Finally, the lines were strung overhead, by wire men atop denuded cocoanut palms in full view of nobody knows how many enemy snipers.

Wire men forded the swift tidal current between Namur and Ennugarret Islands to string a line to Marine artillery on Ennugarret. On the way back, they encountered enemy fire from Namur. They waded 500 or 600 yards under this fire, bent over double so that their helmet brims almost touched the water.

Each time the command post moved with the progress of our forces, most of this wire had to be re-strung. Before leaving Namur, Major Bell estimates that his men strung about 24 miles of wire over an island one-half mile in diameter.

Radio men went into action even before landing. In Colonel Hart's boat, Cpl. Grover R. Bass, Memphis, Tenn.,

"She says she hopes I won't be broken-hearted, but she got married—what's the next number?"

(Courtesy, Gene Carr and This Week. Copyright 1942 by United Newspaper Magazine Corp.)

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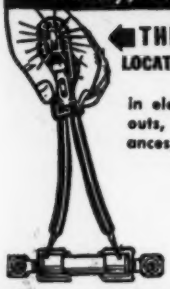

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huddled in drenching rain and salt spray, with a poncho protecting his radio set, receiving reports and sending instructions to all elements of the landing team.

On shore, radio stations were set up generally around the command post but still exposed to random fire and flying death from explosions. Marine Pfc. Bobby R. Swinson, Isabel, Kansas, a radio operator, got a piece of shrapnel in his foot from the explosion of an enemy ammunition dump.

The message center served as a clearing-house for reports and orders in all directions. As fast as they could be decoded or encoded, messages were sent by runners to points with which there was no wire or radio communication. Marine Pfc. Jimmy Ivanhoff, Middletown, O., a message center runner, was making his way toward the front. As he paused to get his bearings, he spotted a Japanese sliding toward him through the brush. In his surprise, Private First Class Ivanhoff fumbled the safety lock on his carbine. Reversing the weapon, he clubbed his foe over the head with it, breaking it in two.

His companion, Pfc. Lester Carlyle, was attracted by the disturbance and finished off the Japanese with a bullet.

Throughout their stay on Namur Island, the communicators kept a 24-hour watch by their telephones and radios. When the first air-raid alert came to occupied Namur, it was a communicator of this landing team that caught the warning from our ships at sea, spread the word among our own and reinforcing units and then telephoned Fourth Division Headquarters to give them their first word of it.

On the day of embarkation from Namur, half of the "com" platoon withdrew with its equipment to the beach and maintained communications from there, while the other half boarded this transport. Thus the combat team remained in constant touch within itself and with outside elements during its entire sojourn on Namur Island.

V V

Alaskan Beavers Fell Telephone Poles

Members of an American Army unit on an Alaskan island outpost were prepared for trouble, but not the kind of trouble furnished by a busy pack of beavers that cut through the entire lot of telephone poles the men had just finished setting around a large lake.

It happened during the night after the last wires had been strung, according to the Baltimore *Sun*. Next morning, the soldiers discovered to their dismay that the beavers had gnawed through and felled every one of the poles. To prevent a recurrence, the men, in replacing the poles, sheathed the base of each one with metal strips cut from tin cans.

V V

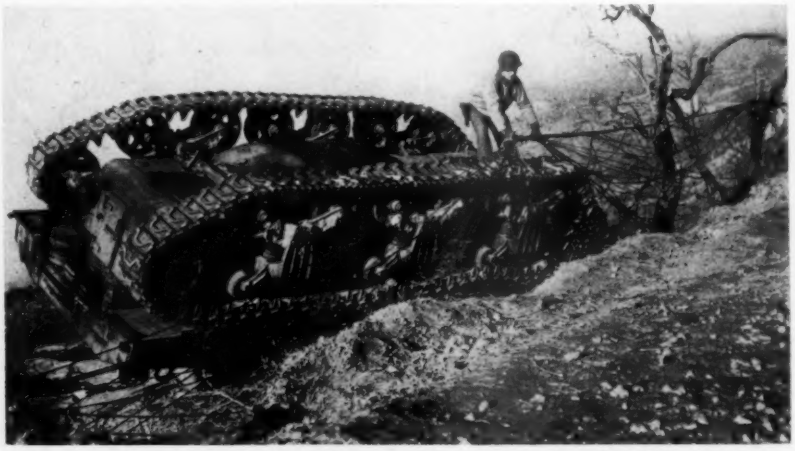
Wind Damages Poles

The sudden, desert wind of Santa Ana, Calif., played havoc with telephone poles and power circuits throughout the city and county, according to reports made recently by officials of the Southern California Telephone Co.

V V

Woods War Fund Head

THOMAS C. WOODS, vice president and general counsel for the Lincoln (Nebr.) Telephone & Telegraph Co., was re-elected chairman of the United War Fund of Nebraska.



(Official U. S. Army Signal Corps Photo)

Though wrecked and over-turned, this U. S. tank still serves a purpose as Cpl. Ivan Baake, Bemidja, Minn., uses it to string signal wires in the Cassino area, Italy.

Watson, Former Stromberg Employe, Dies in Seattle

C. W. Watson, former sales representative of the Stromberg-Carlson Co., died at his home in Seattle, Wash., on April 4. He was a pioneer in the telephone industry, having been in the employ of Stromberg-Carlson since June, 1907.

C. W. WATSON

His first 15 years with the company were spent in the installation department. In 1922 he was transferred to the sales engineering department in Rochester, working as a field sales engineer until 1926 when he was assigned a territory as sales representative. He continued with the company in that capacity until forced by illness to retire in June, 1943.

He is survived by his widow and a son who is serving in the Navy.

V V

Kellogg Company Presents Program at ANEPA Meeting

At the invitation of Lt. Comdr. George C. Norwood, officer in charge of the Chicago Regional Office of the Army, Navy Electronics Production Agency, the Kellogg Switchboard & Supply Co. recently presented an interesting and informative program and exhibit of wartime communications equipment. This program was held at a meeting of ANEPA members at their Chicago headquarters.

A display of the Army and Navy communication equipment, including various types of microphones, telephones, field switchboards, etc., which the company supplies to the armed forces, was referred to by the Kellogg executives who addressed the group. The addresses told the personnel of ANEPA the multiplicity of operations and components entering into the building of the many types of communication apparatus. They emphasized the value of today's coordinated effort in expediting the procurement of necessary supplies and materials. The addresses were of extreme interest to those in attendance for the ANEPA organization has been the expediting agency charged with the responsibility to assist the government contractors in getting the right materials at the right time so that contract requirements of the armed forces can be met and maintained.

Commander Norwood, as ANEPA host, welcomed the Kellogg representatives who were headed by James H. Kellogg, executive vice president of the company. The Kellogg portion of the meeting was directed by R. C. Krueger who served as master of ceremonies. He introduced approximately 25 visiting executives of his company. Mr. Krueger prefaced the addresses of the speakers and with the aid of Dr. F. Barta, chief inspector; S. N. Read, production manager, and H. O. Nordberg, assistant purchasing agent, provided a comprehensive discussion of the operations and methods involved in the production of wartime communication equipment.

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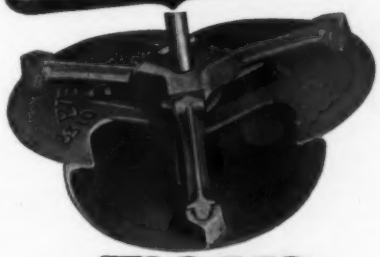

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WANTED: General Plant Manager for exchange of 800 stations, to take care of entire plant including switchboard and cable maintenance. Write, Quincy Telephone Company, Quincy, Florida.

WANTED: Lineman for company located in Ohio, approximately 5,000 stations. Permanent position, good wages to qualified man. In reply give complete information stating experience, draft status, etc. Must be able to furnish Statement of Availability. Write Box No. 2057, c/o TELEPHONY.

WANTED: Line foreman by Ohio Independent company. Satisfactory wages, permanent position for the right man. State complete information in first reply, stating previous experience, draft status, education, etc. Write Box No. 2063, c/o TELEPHONY.

WANTED: Combination man by Ohio company. Permanent position, good wages, for qualified man. Give complete information including experience, draft status, etc. Write Box No. 2064, c/o TELEPHONY.

WANTED: GENERAL MANAGER qualified to operate telephone company in midwestern state having over 12,000 stations. Must have administrative ability and experience in plant construction and maintenance as well as accounting, commercial and traffic operations. Permanent position with excellent salary to qualified man. Give complete information in first reply stating previous experience, draft status, recommendations, etc. Write Box No. 2043, c/o TELEPHONY.

HELP WANTED

WANTED: General Manager for large telephone property. Must have executive ability and administrative experience. Good salary for man having qualifications. In replying, furnish complete information as to age, education, experience, present employment, draft status, small photograph, recommendations, etc. Write, Telephone Services, Inc., 16th Floor, Lincoln Tower, Fort Wayne 2, Indiana.

WANTED: CABLE SPLICER. To locate in Pennsylvania with company operating approximately 8,000 stations. Permanent position with satisfactory wages for qualified man. Give complete information in first reply, stating previous experience, draft status, etc. If presently working with an essential industry, statement of availability will be necessary. Write Box No. 2046, c/o TELEPHONY.

MECHANICAL ENGINEERS: Few experienced in design and construction of small machines and apparatus such as used in communication switching and industrial systems. Essential workers need release statement. Post-war future for good men. Apply in person or write International Telephone & Telegraph Corp., 20th Floor, 67 Broad Street, N. Y. C.

WANTED: Experienced telephone man to take complete charge of magneto exchange in north central Kansas. State age, experience, when available, and salary expected in first letter. Write Box 2062, c/o TELEPHONY.

HELP WANTED

WANTED: Telephone Accountant—qualified to supervise all phases of telephone accounting for Class A companies. Give full information as to age, experience, draft status, etc. Attach small photograph. Write Telephone Services, Inc., 16th Floor, Lincoln Tower, Fort Wayne, Indiana.

WANTED: Combination man for Common Battery and Magneto plant, 375 stations. Can use wife or family to operate magneto plant of 150 stations. House furnished. Give age, experience, draft status, etc. Located in northwestern Indiana. Write Box No. 2060, c/o TELEPHONY.

MECHANICAL DRAFTSMEN: Experienced in design and construction of small machines and apparatus such as used in communication switching and industrial systems. Essential workers need release statement. Post-war future for good men. Apply in person or write International Telephone & Telegraph Corp., 20th Floor, 67 Broad Street, N. Y. C.

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Univise Bronze for Copper to Copper. Also plated for Iron to Iron.

Nutype Bronze for Copper to Copper. Also plated for Iron to Iron.

Univise Bronze with Bi-metallic Washer. For Copper to Iron.

Matthews Telephone Wire Connectors are furnished in two styles for all types of telephone wire connections on No. 8 stranded and smaller wires. Their use eliminates the use of solder and gives you better and more economical connections than any other method. No matter what type of wire connection you have to make, a Matthews Connector will save you money.

Samples and bulletins giving complete information will be sent on request.

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No. 505-C P.B.X.

Equipped with 3 Trunks, 10 Stations to 5 Trunks 12 Stations, 5 Connecting Circuits. Trunks Are Drop Signal Ending. Local Lines Are Equipped with Target Type Visual Signals. Cabinets Can Be Supplied in Either Oak or Mahogany Finish.

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Swiss-Rumanian Telephone Line Cut

Telephonic communications between Switzerland and Rumania, which were not interrupted by the bombing of Bucharest, have been completely cut since a recent raid on Ploesti. The Rumanian legation was not able to telephone the capital.

It is not known whether the interruption was the result of cable destruction or Nazi censorship.

V V

Taps Pay Toll Charges

Authorities accused Newson Williams, a Pittsburgh (Pa.) steam fitter, of making 95 telephone calls to Albany, N. Y., his home, for five cents each by directing well-placed thumps on the coin box to simulate the sound of money being deposited. They said the tolls should have been $195.

V V

More Telephones Than Axis

The United States has more than three times as many telephones as all the Axis powers!

SAFETY PHILOSOPHY

The philosophy of safety is one of hard work as is every worthwhile accomplishment. The conception of safety can be taught and to that extent it may be "sold." To be effective, however, it must be practiced and it must be lived. That is why its achievement is contrary to many of our human tendencies.

Too often we endeavor to save ourselves trouble and work by taking short cuts. We are prone to relax, to take a chance rather than to put forth an effort. We sit idly by and hope accidents won't happen instead of thinking deliberately that they shall not happen. Safety is like a wheelbarrow—if you don't push, it won't go.

—Cadillac War Craftsman.

Telephone Poles on Island of Martinique Take Root

Today's speed of engineering and construction produced a laugh for natives of the island of Martinique, located on the approach to the Panama Canal, French West Indies.

Telephone poles, placed along a new mountain highway, were cut and set so rapidly that they took root in the fertile soil and began sprouting branches all the way up the "trunk."

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B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated. Quotations on request.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Pensacola Creosoting Company, Pensacola, Fla. — Creosoted Southern Pine Poles of Superior Long Leaf Quality.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or butt-treated.

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